

**UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 9**

IN THE MATTER OF: Northeast Church Rock Mine Site New Mexico United Nuclear Corporation and The General Electric Company, Respondents	ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT FOR INTERIM REMOVAL ACTION U.S. EPA Region 9 CERCLA Docket No. 2009-11 Proceeding Under Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622
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**ADMINISTRATIVE ORDER ON CONSENT
INTERIM REMOVAL ACTION
FOR NORTHEAST CHURCH ROCK MINE SITE**

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I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent ("Settlement Agreement") is entered into voluntarily by the United States Environmental Protection Agency ("EPA") and United Nuclear Corporation ("UNC") and General Electric Company ("GE") (collectively "Respondents"). This Settlement Agreement provides for Respondents' performance of an Interim Removal Action as defined in Paragraph 10 and other actions as provided herein as well as Respondents' reimbursement of certain response costs incurred by the United States at or in connection with the Northeast Church Rock Mine site (the "Site") located northeast of Gallup, New Mexico, in Sections 34 and 35, Township 17 North, Range 16 West and Section 3, Township 16 North, Range 16 West in McKinley County, New Mexico. The Site vicinity and the Mine Permit Area of the Site are shown in the Maps in Appendix A. Most of the Mine Permit Area lies within Navajo tribal trust lands administered by the Bureau of Indian Affairs on behalf of the Eastern Agency of the Navajo Nation. Newmont Realty Corp., a subsidiary of Newmont Mining Corporation, owns the mineral interests of certain land within the Mine Permit Area as a patented mining claim, and Respondent UNC owns patented mining claims on approximately 61 acres of the Mine Permit Area.

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622, as amended ("CERCLA").

3. EPA has notified the Environment Department and the Mining and Minerals Division of the State of New Mexico (the "State") and the Navajo Nation of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

4. EPA and Respondents recognize that Respondents have voluntarily offered to perform this action, that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondents in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondents do not admit, and retain the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of facts, conclusions of law, and determinations in Sections IV and V of this Settlement Agreement. Respondents agree to comply with and be bound by the terms of this Settlement Agreement and, subject to the terms of this Settlement Agreement, agree to perform all actions required by this Settlement Agreement and any modifications thereto, and further agree that they will not contest the basis or validity of this Settlement Agreement or its terms. By entering into this Settlement Agreement, Respondents do not consent or submit to and specifically deny any claims of jurisdiction by the Navajo Nation over Respondents.

5. Under this Settlement Agreement, Respondents will perform the Interim Removal Action ("IRA") as provided herein and described in the attached Work Plan. The parties may then discuss the terms of another Settlement Agreement or an Amendment of this Settlement Agreement, which, if executed, may provide, *inter alia* for Respondents' execution of additional

response actions on or near the Mine Permit Area and Red Water Pond Road, based upon the results of investigations performed pursuant to this Settlement Agreement and/or an Engineering Evaluation/Cost Analysis, and for payment of additional response costs for the Site.

II. PARTIES BOUND

6. This Settlement Agreement applies to and is binding upon EPA and upon Respondents and their successors and assigns. Any change in ownership or corporate status of Respondents including, but not limited to, any transfer of assets or real or personal property shall not alter Respondents' responsibilities under this Settlement Agreement.

7. As between Respondents GE and UNC, Respondents are jointly and severally liable for carrying out all activities required by this Settlement Agreement. In the event of the insolvency or other failure of any one or more Respondents to implement the requirements of this Settlement Agreement, the remaining Respondent shall complete all such requirements.

8. Respondents shall ensure that their contractors, subcontractors, and representatives performing any portion of the Work as defined herein receive a copy of this Settlement Agreement and comply with this Settlement Agreement. Respondents shall be responsible for any noncompliance with this Settlement Agreement.

9. EPA intends to consult with and coordinate with the Navajo Nation throughout the performance of the Work and implementation of this Settlement Agreement, and to take Navajo Nation's comments and concerns into consideration. EPA's failure to do so, however, will not affect Respondents' rights or obligations under this Settlement Agreement.

III. DEFINITIONS

10. Unless otherwise expressly provided in this Settlement Agreement, terms used in this Settlement Agreement which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

a. "Action Memorandum" or "Action Memo" shall mean the EPA Action Memorandum relating to the Site signed on July 23, 2009, by the Acting Regional Administrator, Region IX, or her delegate, and all attachments thereto. The Action Memorandum is attached as Appendix B.

b. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. § 9601, *et seq.*

c. "Day" shall mean a calendar day. In computing any period of time under this Settlement Agreement, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

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- d. "Effective Date" shall be the effective date of this Settlement Agreement as provided in Section XXX.
- e. "EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.
- f. "Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement, including but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred to prepare decision documents, the costs incurred pursuant to Section IX (Site Access), including all costs, attorneys fees, monies paid to secure access and any payment of just compensation, as well as any costs associated with EPA's assistance with relocation of residents, Section VIII (Emergency Response), and Paragraph 73 (Work Takeover). Future Response Costs shall also include all Interest, including but not limited to Interest that accrues pursuant to 42 U.S.C. § 9607(a) on Past Response Costs under this Settlement Agreement.
- g. "Interest" shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.
- h. "Interim Removal Action" or "IRA" shall mean the response action described in the attached Action Memorandum.
- i. "IRA Area" shall mean the areas of the Site at which the actions described in the Action Memo and Work Plan, Appendices B and C, respectively, will be performed.
- i. "Mine Permit Area" shall mean the Northeast Church Rock Mine, a former uranium mine, and associated structures and lands, collectively encompassing approximately 125 acres, located approximately 16 miles northeast of Gallup, New Mexico near the intersection of State Highway 566 and Red Water Pond Road and located largely on Navajo tribal trust lands within the Eastern Agency of the Navajo Nation.
- j. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.
- k. "Navajo Nation EPA" or "NNEPA" shall mean the Navajo Nation Environmental Protection Agency and any successor departments or agencies of the Navajo Nation.
- l. "Paragraph" shall mean a portion of this Settlement Agreement identified by an Arabic numeral.

- m. "Parties" shall mean EPA and Respondent.
- n. "Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States paid at or in connection with the Site through the Effective Date, plus Interest on all such costs from the Effective Date through the date of the bill for such costs, unless Respondents fail to make timely payment, in which case Interest shall continue to accrue until the date of payment. Past Response Costs for purposes of this Settlement Agreement shall not include costs associated with the residential removals that have occurred at the Site prior to the Effective Date; however, all claims for such unrecovered cost amounts by the United States are hereby reserved, and nothing in this Settlement Agreement shall be a defense to recovery of such costs. Past Response Costs for purposes of this Settlement Agreement shall also be limited to at most \$1.5 million; however, all claims for any unrecovered cost amounts above this \$1.5-million limit are hereby reserved, and nothing in this Settlement Agreement shall be a defense to recovery of such costs.
- o. "RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901, *et seq.* (also known as the Resource Conservation and Recovery Act).
- p. "Respondents" shall mean the United Nuclear Corporation ("UNC") and the General Electric Company ("GE").
- q. "Section" shall mean a portion of this Settlement Agreement identified by a Roman numeral.
- r. "Settlement Agreement" shall mean this Administrative Settlement Agreement and Order on Consent and all appendices attached hereto, which are listed in Section XXIX (Severability, Integration and Appendices). In the event of conflict between this Settlement Agreement and any appendix, this Settlement Agreement shall control.
- s. "Site" shall mean the Mine Permit Area and other areas where hazardous substances associated with the Northeast Church Rock Mine have been deposited, stored, disposed of, placed, or otherwise come to be located.
- t. "State" shall mean the State of New Mexico.
- u. "Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); and 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).
- v. "Work" shall mean all activities Respondents are required to perform under this Settlement Agreement.

IV. FINDINGS OF FACT

EPA hereby finds the following facts, which Respondents neither admit nor deny:

11. The Mine Permit Area is a mining area of approximately 125 acres. The majority of the Mine Permit Area of the Site was operated by Respondent UNC under the terms of a mineral lease with the predecessors of what is now Newmont Mining Corporation as owner of the mineral estate. The surface estate of this portion is owned by the United States in trust for the Navajo Nation. Respondent UNC owns an approximately 61-acre portion of the Mine Permit Area as a patented mining claim.

12. The Mine Permit Area is adjacent to the UNC NPL site ("the Mill Site"), which Respondent UNC is remediating under the oversight of the Nuclear Regulatory Commission and Region 6 of the EPA. The Mine Permit Area was one of the sources of uranium ore for the adjacent UNC site. Respondent UNC operated the mine from approximately 1967 to 1982. The mining operations consisted of two underground mine shafts, a series of vent holes, and support facilities. The Site currently includes uranium mine waste piles, several former ponds and former sand fill (mill tailings) storage areas, a debris pile and other prior support activities areas. The conditions at the Site present a risk of potential releases of hazardous substances to the air, surrounding soils, sediments, surface water, and ground water. Kerr McGee Corporation operated another former uranium mine situated in close proximity to the Site. Materials from the Kerr-McGee operation were reportedly dispersed on Red Water Pond Road by the haul trucks on their way to the Kerr McGee mill or the road bed may be constructed of waste ore.

13. The State's Mining and Minerals Division asserted jurisdiction over the mine under the New Mexico Mining Act in 1994. In August 2004, the New Mexico Environment Department issued a letter requiring a groundwater abatement plan to Respondent UNC. In January 2005, the Navajo Nation communicated to the State the Nation's determination that the majority of the Mine Permit Area is on lands that were assigned to the Navajo Nation in the 1880s.

14. Under a 1991 Memorandum of Agreement between the Navajo Nation and EPA Regions 6, 8 and 9, EPA Region 9 has the lead on any EPA response action on lands within the Navajo Nation. On March 11, 2005, the Navajo Nation requested that the EPA take the jurisdictional lead on overseeing the reclamation and remediation of the Site, pursuant to the Memorandum of Agreement. The State of New Mexico has agreed to defer to EPA Region 9 enforcement with respect to the Site.

15. The Mine Permit Area is subject to a National Pollutant Discharge Elimination System ("NPDES") General Storm Water Permit, effective September 29, 2008, issued by U.S. EPA.

16. Portions of the Mine Permit Area were subject to a source materials license from the U.S. Nuclear Regulatory Commission ("NRC"). In 1987, NRC issued a memorandum stating the following: "Based on the equilibrium ratio data, UNC concluded that remaining Ra-226 levels in excess of the Criterion 5 limit result from low grade ore or mine waste. In addition, staff review of the data for areas exceeding 7 pCi/g indicates the U-nat values are significantly higher than the low values which would be expected from tailings. Based on the equilibrium ratio and U-

nat data provided by the licensee, the staff concludes that UNC has adequately removed remaining byproduct material from the mine site. No further action is therefore necessary.”

17. Residences to the northeast of the Mine Permit Area and west and southwest of the former Kerr-McGee Mine may have been impacted by releases of hazardous substances and contaminants transported by wind, historic dewatering of mining operations, and runoff during snow, rain and flood events.

18. EPA has detected elevated levels of alpha radiation at the Site and radium-226 in the surface soils. Radium is a “hazardous substance” as defined by section 101(14) of CERCLA.

19. This Settlement Agreement reserves and does not address investigation and cleanup of groundwater, among other items. Drinking water from the Mariano Lake Chapter public water supply is available to residents to the northeast of the Mine Permit Area.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

20. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, EPA has determined that:

a. The Northeast Church Rock Mine is a “facility” as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at the Site, as identified in the Findings of Fact above, includes “hazardous substances” as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. Each of the Respondents is a “person” as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. Respondent UNC is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is liable for performance of response actions and for response costs incurred and to be incurred at the Site.

i. Respondent UNC is an “owner” of the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1).

ii. Respondent UNC was the “owner” and/or “operator” of the facility at the time of disposal of hazardous substances at the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(2) of CERCLA, 42 U.S.C. § 9607(a)(2).

iii. In 1997, Respondent UNC became a wholly-owned, indirect, subsidiary of Respondent GE. Respondent GE is providing financial assurance for the Work and, as a Respondent, guarantees performance of the Work.

e. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility as defined by Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

f. The Interim Removal Action required by this Settlement Agreement is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Settlement Agreement, will be considered consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

g. The Interim Removal Action required by this Settlement Agreement meets the criteria for a removal action under Section 300.415(b) of the NCP.

VI. SETTLEMENT AGREEMENT AND ORDER

21. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, it is hereby Ordered and Agreed that Respondents shall comply with all provisions of this Settlement Agreement, including, but not limited to, all attachments to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATOR, AND ON-SCENE COORDINATOR

22. Respondents shall retain one or more contractors to perform the Work and shall notify EPA of the name(s) and qualifications of such contractor(s) within thirty (30) days of the Effective Date. Respondents shall also notify EPA of the name(s) and qualification(s) of any other contractor(s) or subcontractor(s) retained to perform the Work at least seven (7) days prior to commencement of such Work. EPA retains the right to disapprove of any or all of the contractors and/or subcontractors retained by Respondents. If EPA disapproves of a selected contractor, Respondents shall retain a different contractor and shall notify EPA of that contractor's name and qualifications within thirty (30) days of EPA's disapproval. The proposed contractor(s) must demonstrate compliance with ANSI/ASQC E-4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared in accordance with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B0-1/002), or equivalent documentation as required by EPA. EPA hereby approves the use of Respondents existing contractors MACTEC Development Corporation and MWH Americas.

23. Respondents have designated a Project Coordinator for this Project:

Lance Hauer, Project Manager
Corporate Environmental Programs
The General Electric Company
640 Freedom Business Center
King of Prussia, PA 19406
(610) 992-7972

Email: "Lance Hauer" <lance.hauer@ge.com>

To the greatest extent possible, the Project Coordinator shall be present on Site or readily available during Site work. EPA retains the right to disapprove of the designated Project Coordinator. If EPA disapproves of the designated Project Coordinator, Respondents shall retain a different Project Coordinator and shall notify EPA of that person's name, address, telephone number, and qualifications within fifteen (15) days following EPA's disapproval. Receipt by Respondents' Project Coordinator of any notice or communication from EPA relating to this Settlement Agreement shall constitute receipt by the Respondents.

24. EPA has designated Andrew Bain, Remedial Project Manager in the Region 9 Superfund Division, and Harry Allen, On-Scene Coordinator in the Region 9 Superfund division, as its On-Scene Coordinators ("OSCs"). Except as otherwise provided in this Settlement Agreement, Respondents shall direct all submissions required by this Settlement Agreement to both OSCs and to the Navajo Nation, by U.S. Mail, overnight mail, facsimile, or email, as follows:

Andrew Bain
U.S. EPA, Mail Code SFD-8-2
75 Hawthorne St.
San Francisco, CA 94105
Telephone 415-972-3167
Facsimile 415-947-3528
Email Bain.Andrew@epa.gov

and

Harry Allen (Alternate OSC)
U.S. EPA, Mail Code SFD-9-2
75 Hawthorne St.
San Francisco, CA 94105
Telephone 415-972-3063
Facsimile 415-947-3518
Email Allen.HarryL@epa.gov

and

David A. Taylor
Navajo Nation Department of Justice
P.O. Drawer 2010
Window Rock, AZ 86515
Telephone 928-871-6932
Fax 928-871-6200
Email davidataylor@navajo.org

Two hard copies of all Work Plan submittals shall be provided to Andy Bain, EPA Project Manager, at the address above, and one hard copy of all Work Plan submittals shall be provided to Stanley Edison of NNEPA at P.O. Box 2946, Window Rock, Navajo Nation, Arizona 86515. In addition, in all cases where a non-email submission is required or selected, an email shall also be sent with the same information, including an email to Stanley Edison of NNEPA at pasi_swa@hotmail.com.

25. EPA and Respondents shall have the right, subject to the requirements of this Section, to change their respective designated OSC(s) or Project Coordinator. Respondents shall notify EPA fifteen (15) days before such a change is made. The initial notification may be made orally, but shall be promptly followed by a written notice. The Navajo Nation may change its contact person by written notice to EPA and Respondents.

VIII. WORK TO BE PERFORMED

26. Respondents shall perform, at a minimum, all actions necessary to implement the Interim Removal Action, as described in the attached Work Plan, Appendix C. The actions to be implemented generally include, but are not limited to, the following:

(a) Excavation: excavation of all soils and sediments contaminated with Radium 226 above the Interim Response Action off-site action level of 2.24 pCi/g in designated areas and step-out areas,

(b) Regrading and Waste Deposition: regrading of the NECR-1 waste pile and placement of newly excavated soils on the waste pile,

(c) Regrading/Cover/Drainage: regrading and covering with clean fill of the NECR-1 waste pile to reduce the chances of drainage of contaminants onto the side slopes and to convey surface drainage into the area designated as Pond 3,

(d) Temporary Relocation and Services: provide temporary relocation and temporary relocation services for residents of 3 home sites on the reservation lands in proximity to the Work,

(e) Investigation: conduct limited sampling of the segment of Red Water Pond Road beginning immediately south of the west-east running arroyo (Unnamed Arroyo #2) and continuing approximately 2,000 feet south, to the intersection of Highway 566 and Red Water Pond Road, as well as the vicinity immediately surrounding the Road to determine which portions of this area are in need of remediation,

(f) Revegetation: backfill, as necessary, with clean fill and revegetate areas impacted by the Interim Remedial Action, and

(g) Confirmation Sampling: Conduct confirmation sampling at a 5% frequency and a minimum of 20 samples prior to backfilling

All Work will be conducted in compliance with all regulatory requirements, including but not limited to the Applicable, Relevant and Appropriate Requirements ("ARARs") identified in EPA's Action Memo for the Interim Removal Action, provided as Appendix B, as well as in accordance with the Health and Safety Plan developed pursuant to this Settlement Agreement.

27. Work Plan Approval Respondents have submitted to EPA a Work Plan provided as Appendix C ("Approved Work Plan"), which is hereby incorporated by this reference, for performing the Interim Removal Action. This Work Plan is hereby approved. Within 10 days after the Effective Date, Respondents shall submit a schedule of activities ("Schedule") for EPA approval.

28. Submittals, Approvals and Implementation EPA, after consultation with NNEPA, has approved the Approved Work Plan, but may approve, disapprove, require revisions to, or modify, in whole or in part, all documents submitted under this Settlement Agreement (collectively, "Submittals"), provided such revisions or modifications do not materially expand the scope of the Work Plan. EPA has agreed to provide its review of and responses to all submittals within 2-weeks time. This two-week period shall begin on the date each submittal is e-mailed to EPA. Respondents may request a shorter review and response from EPA for any particular submittal, and EPA agrees to consider such requests. If EPA requires revisions, Respondents shall submit a revised Submittal within 30 days of receipt of EPA's notification of the required revisions. Respondents shall implement the Submittal as approved in writing by EPA in accordance with the schedule approved by EPA. Once approved, or approved with modifications, the Submittal, the Schedule, and any subsequent modifications shall be deemed incorporated into and become fully enforceable under this Settlement Agreement. All Work under this Settlement Agreement and/or the Interim Removal Work Plan shall be conducted in accordance with the provisions of this Order, CERCLA, the NCP and relevant EPA guidance. Respondent shall not commence any Work, except in conformance with the terms of this Settlement Agreement. Respondent shall not commence implementation of any Work Plan developed hereunder until receiving EPA approval.

29. Health and Safety Plan. Within seven (7) days after the Effective Date, Respondents shall submit for EPA review and comment a plan that ensures the protection of the public health and safety during performance of on-Site work under this Settlement Agreement. This plan shall be prepared in accordance with EPA's Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992). In addition, the plan shall comply with all currently applicable Occupational Safety and Health Administration ("OSHA") regulations found at 29 C.F.R. Part 1910. If EPA determines that it is appropriate, the plan shall also include contingency planning. Respondents shall incorporate all changes to the plan recommended by EPA and shall implement the plan during the pendency of the removal action.

30. Quality Assurance and Sampling.

a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to EPA direction, approval, and guidance, after consultation with NNEPA, regarding sampling, quality assurance/quality control ("QA/QC"), data validation, and chain of custody procedures. Respondents shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate EPA guidance. Respondents shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondents shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001)," or equivalent documentation as determined by EPA. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements.

b. Upon request by EPA, Respondents shall have such a laboratory analyze samples submitted by EPA for QA monitoring. Respondents shall provide to EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

c. Upon request by EPA and/or the NNEPA, Respondents shall allow EPA and/or the NNEPA, or their authorized representatives, to take split and/or duplicate samples. Respondents shall notify EPA not less than fifteen (15) days in advance of any sample collection activity, unless shorter notice is agreed to by EPA. EPA shall have the right to take any additional samples that EPA deems necessary. Upon request, EPA shall allow Respondents to take split or duplicate samples of any samples it takes as part of its oversight of Respondents' implementation of the Work.

d. Respondents shall submit validated data to EPA electronically (MS Office compatible) within two (2) business days of its receipt by Respondents.

31. In accordance with the Work Plan schedule, or as otherwise directed by EPA, Respondents shall submit a proposal for post-removal site control consistent with Section 300.415(l) of the NCP and OSWER Directive No. 9360.2-02. Upon EPA approval, Respondents shall implement such controls and shall provide EPA with documentation of all post-removal site control arrangements.

32. Reporting.

Unless otherwise directed in writing by the OSC, Respondents shall submit a written progress report to EPA and NNEPA concerning actions undertaken pursuant to this Settlement Agreement every month after the Effective Date of this Settlement Agreement until termination of this Settlement Agreement. These reports shall describe all significant

developments during the preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

a. Respondents shall submit three (3) copies of all plans, reports or other submissions required by this Settlement Agreement or any approved work plan, with two copies to be sent to US EPA and one copy to be sent to NNEPA. Upon request by EPA, Respondents shall submit such documents in electronic form whenever feasible.

b. Any Respondent who owns or controls real property at the Site shall, at least 30 days prior to the conveyance of any interest in real property at the Site, give written notice to the transferee that the property is subject to this Settlement Agreement and written notice to EPA and the Navajo Nation of the proposed conveyance, including the name and address of the transferee. Any Respondent who owns or controls real property at the Site also agrees to require that their successors comply with the immediately preceding sentence and Sections IX (Site Access) and X (Access to Information).

33. Final Report. Within ninety (90) days after receipt of analytical results, Respondents shall submit for EPA review and approval after consultation with NNEPA, a final report (the Interim Removal Action Report) summarizing the actions taken to comply with this Settlement Agreement. The final report shall conform, to the extent applicable, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports", and with "Superfund Removal Procedures: Removal Response Reporting – POLREPS and OSC Reports" (OSWER Directive No. 9360.3-03, June 1, 1994). The final report shall include a good faith estimate of total costs or a statement of actual costs incurred in complying with the Settlement Agreement, a listing of quantities and types of materials removed off-Site or handled on-Site, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and all manifests and permits generated during the removal action. The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

34. Off-Site Shipments

a. Respondents shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification of such shipment of Waste Material to the appropriate state environmental official in the receiving facility's state and

to the On-Scene Coordinator. However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

i. Respondents shall include in the written notification the following information: 1) the name and location of the facility to which the Waste Material is to be shipped; 2) the type and quantity of the Waste Material to be shipped; 3) the expected schedule for the shipment of the Waste Material; and 4) the method of transportation. Respondents shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

ii. The identity of the receiving facility and state will be determined by Respondents following the award of the contract for the removal action. Respondents shall provide the information required by subparagraph a. and b. of this paragraph, as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

b. Before shipping any hazardous substances, pollutants, or contaminants from the Site to an off-site location, Respondents shall obtain EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondents shall only send hazardous substances, pollutants, or contaminants from the Site to an off-site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence. Off-site transfers of laboratory samples and wastes pursuant to 40 C.F.R. § 300.440(a)(5) are not subject to the requirements of this subparagraph.

IX. SITE ACCESS

35. If the Site, or any other property where access is needed to implement this Settlement Agreement, is owned or controlled by Respondents, Respondents shall, commencing on the Effective Date: (1) provide EPA and its representatives, including contractors, with access at all reasonable times to the Site, or such other property, for the purpose of conducting any activity related to this Settlement Agreement, and (2) provide the NNEPA and its designated representatives, including technical contractors, with access at all reasonable times to the Site, or such other property, for the purpose of overseeing, observing, monitoring, and taking split samples, during any EPA activities related to this Settlement Agreement.

36. With regard to access to the residences and residential yards to the northeast of the Mine Permit Area, Respondents shall consult with EPA and NNEPA on a coordinated access approach, which will include EPA and NNEPA making the initial effort to obtain necessary access agreements. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondents, Respondents shall use their best efforts to obtain all necessary access agreements within fifteen (15) days after the Effective Date, or as otherwise specified in writing by the OSC. Respondents shall immediately notify EPA and the Navajo Nation if, after using their best efforts, Respondents are unable to obtain such agreements. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access. Respondents shall describe in writing

Respondents efforts to obtain access. EPA may then assist Respondents in gaining access, to the extent necessary to effectuate the response actions described herein, using such means as EPA deems appropriate. Respondents shall reimburse EPA for all costs and attorney's fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XV (Payment of Response Costs). NNEPA will provide the Navajo Nation's authorization to access Navajo lands in the form of an appropriately executed authorization letter.

37. Commencing on the Effective Date of this Settlement Agreement, Respondents shall refrain from using the IRA Area in any manner that would interfere with or adversely affect the implementation, integrity, or protectiveness of the response measures to be implemented pursuant to this Settlement Agreement. Such restricted or prohibited activities in the IRA Area include, but are not limited to, excavation in the areas of the treatment ponds (i.e. Ponds #1, 2, 3 and 3a) or waste pile(s) in the Mining Permit Area or disturbance of any soils in any manner in such areas that might cause a release of wastes, except as provided for under this Settlement Agreement or any other Orders under CERCLA EPA has issued to or entered into with UNC with respect to the NECR Mine Site. Should Respondents be required to take any action under a storm water permit that Respondents believes may conflict with this Paragraph, Respondents shall consult with EPA prior to taking such action, and shall work with EPA, after consultation with NNEPA, to minimize soil disturbance or other adverse consequences of such action.

38. Notwithstanding any provision of this Settlement Agreement, EPA retains all of its access authorities and rights, as well as all of its rights to require land/water use restrictions, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

X. ACCESS TO INFORMATION

39. Respondents shall provide to EPA, upon request, copies of all documents and information within their possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Settlement Agreement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondents shall also make reasonably available to EPA, for purposes of investigation or information gathering, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

40. Respondents may assert business confidentiality claims covering part or all of the documents or information submitted to EPA under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to EPA, or if EPA has notified Respondents that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public and the Navajo Nation

may be given access to such documents or information without further notice to Respondents, as provided in 40 C.F.R. Part 2 Subpart B.

41. Respondents may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Respondents asserts such a privilege in lieu of providing documents, it shall provide EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the contents of the document, record, or information; and 6) the privilege asserted by Respondents. However, no documents, reports or other information required to be submitted under this Settlement Agreement shall be withheld on the grounds that they are privileged.

42. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site generated on or after January 1, 2005.

XI. RECORD RETENTION

43. Until 7 years after Respondents' receipt of EPA's notification pursuant to Section XXVIII (Notice of Completion of Work), Respondents shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in their possession or control or which come into their possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Site, regardless of any corporate retention policy to the contrary. Until 7 years after Respondents' receipt of EPA's notification pursuant to Section XXVIII (Notice of Completion of Work), Respondents shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to performance of the Work.

44. At the conclusion of this document retention period, Respondents shall notify EPA and the Navajo Nation at least 90 days prior to the destruction of any such records or documents, and, upon request by EPA or the Navajo Nation, Respondents shall deliver any such records or documents to EPA or the Navajo Nation. Respondents may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondents asserts such a privilege, it shall provide EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by Respondents. However, no final documents, reports or other information created or generated under this Settlement Agreement shall be withheld on the grounds that they are privileged.

45. Respondents hereby certify that to the best of their knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records,

documents or other information (other than identical copies) relating to their potential liability regarding the Site since May 23, 2006 and that they have fully complied with any and all EPA requests for information regarding the Site pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XII. COMPLIANCE WITH OTHER LAWS

46. Respondents shall perform all actions required pursuant to this Settlement Agreement in accordance with all applicable local, state, tribal, and federal laws and regulations except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 6921(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-Site actions required pursuant to this Settlement Agreement shall, to the extent practicable, as determined by EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (“ARARs”) under federal environmental or state environmental or facility siting laws.

XIII. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

47. In the event of any action or occurrence during performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondents shall immediately take all appropriate action. Respondents shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondents shall also immediately notify the OSCs or, in the event of their unavailability, the on-call OSC for the Emergency Response Section, of the Region 9 Superfund Division, 415-947-4400, of the incident or Site conditions. In the event that Respondents fails to take appropriate response action as required by this Paragraph, and EPA takes such action instead, Respondents shall reimburse EPA all costs of the response action not inconsistent with the NCP pursuant to Section XV (Payment of Response Costs).

48. In addition, in the event of any release of a hazardous substance from the Site in excess of reportable quantities, Respondents shall immediately notify the OSCs either in person or by phone at (415) 972-3167 and (415) 972-3063, the Region 9 Spill Response Center at 415-947-4400, and the National Response Center at (800) 424-8802. Respondents shall submit a written report to EPA within 7 days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, *et seq.*

XIV. AUTHORITY OF ON-SCENE COORDINATOR

49. The OSCs, in consultation with NNEPA, shall be responsible for overseeing Respondents' implementation of this Settlement Agreement. Each OSC shall have the authority vested in an OSC by the NCP, including the authority to halt, conduct, or direct any Work required by this Settlement Agreement, or to direct any other removal action undertaken at the Site. Absence of the OSCs from the Site shall not be cause for stoppage of work unless specifically directed by the OSC. The lead OSC is Andrew Bain; Harry Allen is the alternate.

XV. PAYMENT OF RESPONSE COSTS

50. Payments for Past Response Costs.

a. Respondents shall pay EPA all Past Response Costs not inconsistent with the NCP that EPA has incurred with respect to the Site within forty-five (45) days of EPA's presentation of a bill with a cost summary for such costs. However, Respondents may contest such costs to the extent permitted by, and consistent with the procedures set forth in paragraph 53 and Section XVI (Dispute Resolution).

b. Payment shall be made to EPA by mailing a certified or cashier's check to the following address:

US Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
PO Box 979076
St. Louis, MO 63197-9000

All payments shall be accompanied by a statement identifying the name and address of the party making payment, the Site name, the EPA Region and Site/Spill ID Number 09SR, and the EPA docket number for this action. Respondents shall also provide the specific reason for the payment, including that the payment is for Past Response Costs in response to a billing on a specified date.

If Respondents prefer to pay by Electronic Fund Transfer ("EFT"), they may request that EPA provide EFT instructions for making payments pursuant to this Settlement Agreement.

c. At the time of payment, Respondents shall send notice that such payment has been made by email to acctsreceivable.cinwd@epa.gov, and to:

EPA Cincinnati Finance Office
26 Martin Luther King Drive
Cincinnati, Ohio 45268

Andrew Bain (Mail Code: SFD-6-2)
U.S. EPA Region 9
75 Hawthorne St.
San Francisco, CA 94105

d. The total amount(s) to be paid by Respondents pursuant to subparagraph a. of this

paragraph shall be deposited by EPA in the Northeast Church Rock Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct/or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund.

51. Payments for Future Response Costs, Including Interest.

a. Respondents shall pay EPA all Future Response Costs incurred related to or for the Interim Removal Action as described in the Action Memo and/or Work Plan not inconsistent with the NCP. On a periodic basis, EPA will send Respondents a bill requiring payment that includes a cost summary, which includes direct and indirect costs incurred by EPA and its contractors. Respondents shall make all payments within 30 days of receipt of each bill requiring payment. In the event that Respondents do not make timely payments, Interest and Stipulated Penalties may accrue

b. Respondents' Future Response Costs payments to EPA shall be made by mailing a certified or cashier's check to the following address:

US Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
PO Box 979076
St. Louis, MO 63197-9000

If Respondents prefer to pay by EFT, they may request that EPA provide EFT instructions for making payments pursuant to this Settlement Agreement.

c. All payments shall be accompanied by a statement identifying the name and address of the party making payment, the Site name, the EPA Region and Site/Spill ID Number 09SR, and the EPA docket number for this action. Respondents shall also specify that the payment is for Future Response Costs and/or Interest, in response to a billing on a specified date.

d. At the time of payment, Respondents shall send notice that payment has been made to:

EPA Cincinnati Finance Office
26 Martin Luther King Drive
Cincinnati, Ohio 45268

Andrew Bain (Mail Code: SFD-6-2)
U.S. EPA Region 9
75 Hawthorne St.
San Francisco, CA 94105

e. The total amount(s) to be paid by Respondents pursuant to subparagraph a. of this paragraph shall be deposited in the Northeast Church Rock Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund.

52. In the event that payments for Future Response Costs are not made within 30 days of Respondents' receipt of a bill, Respondents shall pay Interest on the unpaid balance. Interest on Past Response Costs shall begin to accrue on the Effective Date and shall continue to accrue until the date of the bill for those costs. In the event of a failure to pay Past Response Costs or Future Response Costs within 30 days of Respondents' receipt of a bill, Interest on Future Response Costs and additional interest on Past Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondents' failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XVIII.

53. Respondents may dispute all or part of a bill for Past Response Costs or Future Response Costs submitted under this Settlement Agreement, if Respondents alleges that EPA has made an accounting error, or if Respondents alleges that a cost item is inconsistent with the NCP. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as agreed by the Parties. If the dispute is not resolved before payment is due, Respondents shall pay the full amount of the uncontested costs to EPA as specified in Paragraph 51 on or before the due date. Within the same time period, Respondents shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondents shall simultaneously transmit a copy of both checks to the persons listed in Paragraph 51.d. above. Respondents shall ensure that the prevailing party or parties in the dispute shall receive the amount upon which they prevailed from the escrow funds plus interest within ten (10) days after the dispute is resolved.

XVI. DISPUTE RESOLUTION

54. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt in good faith to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

55. If Respondents object to any EPA action taken pursuant to this Settlement Agreement, including billings for Past or Future Response Costs, they shall notify EPA in writing of their objection(s) within thirty (30) days of such action, unless the objection(s) has/have been resolved informally. EPA and Respondents shall have thirty (30) days from EPA's receipt of Respondents' written objection(s) to resolve the dispute through formal negotiations (the "Negotiation Period"). The Negotiation Period may be extended at the sole discretion of EPA.

56. Any agreement reached by the parties pursuant to this Section shall be in writing and shall, upon signature by both parties, be incorporated into and become an enforceable part of this Settlement Agreement. If the Parties are unable to reach an agreement within the Negotiation Period, an EPA management official at the Division Director level or higher will issue a written decision on the dispute to Respondents. EPA's decision shall be incorporated into and become an enforceable part of this Settlement Agreement. Respondents' obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondents

shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with EPA's decision, whichever occurs.

XVII. FORCE MAJEURE

57. Respondents agree to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a *force majeure*. For purposes of this Settlement Agreement, a *force majeure* is defined as any event arising from causes beyond the control of Respondents, or of any entity controlled by Respondents, including but not limited to their contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondents' best efforts to fulfill the obligation. *Force majeure* does not include financial inability to complete the Work, increased cost of performance, or failure to attain performance standards or action levels set forth in the Action Memorandum.

58. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a *force majeure* event, Respondents shall notify EPA orally within forty-eight (48) hours of when Respondents first knew that the event might cause a delay. Within seven (7) days thereafter, Respondents shall provide to EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondents' rationale for attributing such delay to a *force majeure* event if it intends to assert such a claim; and a statement as to whether, in the opinion of Respondents, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall preclude Respondents from asserting any claim of *force majeure* for that event for the period of time of such failure to comply and for any additional delay caused by such failure.

59. If EPA agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this Settlement Agreement that are affected by the *force majeure* event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the *force majeure* event shall not, of itself, extend the time for performance of any other obligation. If EPA does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, EPA will notify Respondents in writing of its decision. If EPA agrees that the delay is attributable to a *force majeure* event, EPA will notify Respondents in writing of the length of the extension, if any, for performance of the obligations affected by the *force majeure* event.

XVIII. STIPULATED PENALTIES

60. Respondents shall be liable to EPA for stipulated penalties in the amounts set forth in Paragraphs 61 and 62, below, for failure to comply with the requirements of this Settlement Agreement specified below, unless excused under Section XVII (*Force Majeure*).

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“Compliance” by Respondents shall include completion of the activities under this Settlement Agreement or any work plan or other plan approved under this Settlement Agreement identified below in accordance with all applicable requirements of law, this Settlement Agreement, and any plans or other documents approved by EPA pursuant to this Settlement Agreement and within the specified time schedules established by and approved under this Settlement Agreement.

61. Stipulated Penalty Amounts - Major.

a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Paragraph 61.b:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$1,000	1st through 14th day
\$1,500	15th through 30th day
\$2,000	31st day and beyond

b. Compliance Milestones

- i. Failure to timely submit a final report meeting the requirements of Paragraph 33;
- ii. Failure to make a payment when due.

62. Stipulated Penalty Amounts - Other. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports or other written documents, failure to timely perform actions pursuant to this Settlement Agreement, or other noncompliance other than those specified in the preceding Paragraph:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$500	1st through 14th day
\$1,000	15th through 30th day
\$2,000	31st day and beyond

63. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 73 of Section XX (Reservation of Rights), Respondents shall be liable for a stipulated penalty in the amount of \$250,000.

64. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: 1) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 31st day after EPA’s receipt of such submission until the date that EPA notifies Respondents of any deficiency; and 2) with respect to a decision by the EPA Management Official at the Division Director level or higher, under Section XVI (Dispute Resolution), during the period, if any, beginning on the 21st day after the Negotiation Period begins until the date that the EPA management official issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate

violations of this Settlement Agreement.

65. Following EPA's determination that Respondents have failed to comply with a requirement of this Settlement Agreement, EPA may give Respondents written notification of the failure and describe the noncompliance. EPA may send Respondents a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified Respondents of a violation.

66. All penalties accruing under this Section shall be due and payable to EPA within 30 days of Respondents' receipt from EPA of a demand for payment of the penalties, unless Respondents invokes the dispute resolution procedures under Section XVI (Dispute Resolution). All payments to EPA under this Section shall be paid by certified or cashier's check(s) made payable to "EPA Hazardous Substances Superfund," shall be mailed to:

US Environmental Protection Agency
Fines and Penalties
Cincinnati Finance Center
PO Box 979077
St. Louis, MO 63197-9000

A memo accompanying the payment shall indicate that the payment is for stipulated penalties, and shall reference the EPA Region and Site/Spill ID Number 09SR, the EPA docket number for this action, and the name and address of the party making payment. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to EPA as provided in Paragraph 24.

67. The payment of penalties shall not alter in any way Respondents' obligation to complete performance of the Work required under this Settlement Agreement.

68. Penalties shall continue to accrue during any dispute resolution period, but need not be paid until 15 days after the dispute is resolved by agreement or by receipt of EPA's decision.

69. If Respondents fails to pay stipulated penalties when due, EPA may institute proceedings to collect the penalties, as well as Interest. Respondents shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 66. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of EPA to seek any other remedies or sanctions available by virtue of Respondents' violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(l) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(l), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that EPA shall not seek civil penalties pursuant to Section 106(b) or 122(l) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of this Settlement Agreement or in the event that EPA assumes performance of a portion or all of the Work pursuant to Section XX, Paragraph 73 (Work
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Takeover). Notwithstanding any other provision of this Section, EPA may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XIX. COVENANT NOT TO SUE BY EPA

70. In consideration of the actions that will be performed and the payments that will be made by Respondents under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, EPA covenants not to sue or to take administrative action against Respondents pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for performance of the Work and for recovery of Past Response Costs and Future Response Costs. This covenant not to sue shall take effect upon receipt by EPA of the Past Response Costs due under Section XV of this Settlement Agreement and any Interest or Stipulated Penalties due for failure to pay Past Response Costs as required by Sections XV and XVIII of this Settlement Agreement. This covenant not to sue is conditioned upon the complete and satisfactory performance by Respondents of their obligations under this Settlement Agreement, including, but not limited to, payment of Future Response Costs pursuant to Section XV. This covenant not to sue extends only to Respondents and does not extend to any other person.

XX. RESERVATIONS OF RIGHTS BY EPA

71. Except as specifically provided in this Settlement Agreement, nothing herein shall limit the power and authority of EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing herein shall prevent EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement, from taking other legal or equitable action as it deems appropriate and necessary, or from requiring Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law.

72. The covenant not to sue set forth in Section XIX above does not pertain to any matters other than those expressly identified therein. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondents with respect to all other matters, including, but not limited to:

- a. claims based on a failure by Respondents to meet a requirement of this Settlement Agreement;
- b. liability for costs not included within the definitions of Past Response Costs or Future Response Costs;
- c. liability for performance of any response action other than the Work;
- d. criminal liability;

- e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;
- f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site; and
- g. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry, or other Federal agencies, related to the Site.

73. Work Takeover.

- a. In the event EPA determines that Respondents have (i) ceased implementation of any portion of the Work, or (ii) are seriously or repeatedly deficient or late in their performance of the Work, or (iii) are implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may issue a written notice ("Work Takeover Notice") to the Respondents. Any Work Takeover Notice issued by EPA will specify the grounds upon which such notice was issued and will provide Respondents a period of 10 days within which to remedy the circumstances giving rise to EPA's issuance of such notice.
- b. If, after expiration of the 10-day notice period specified in subparagraph a. of this paragraph, Respondents have not remedied to EPA's satisfaction the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, EPA may at any time thereafter assume the performance of all or any portions of the Work as EPA deems necessary ("Work Takeover"). EPA shall notify Respondents in writing (which writing may be electronic) if EPA determines that implementation of a Work Takeover is warranted under this subparagraph b.
- c. Respondents may invoke the procedures set forth in Section XVI (Dispute Resolution), Paragraph 54, to dispute EPA's implementation of a Work Takeover under subparagraph b. of this paragraph. However, notwithstanding Respondents' invocation of such dispute resolution procedures, and during the pendency of any such dispute, EPA may in its sole discretion commence and continue a Work Takeover under subparagraph b. of this paragraph until the earlier of (i) the date that Respondents remedy, to EPA's satisfaction, the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice or (ii) the date that a final decision is rendered in accordance with Section XVI (Dispute Resolution), requiring EPA to terminate such Work Takeover.
- d. After commencement and for the duration of any Work Takeover, EPA shall have immediate access to and benefit of any performance guarantee(s) provided pursuant to Section XXVI (Performance Guarantee) of this Settlement Agreement in accordance with the provisions of Paragraph 91 of that Section. If and to the extent that EPA is unable to secure the resources guaranteed under any such performance guarantee(s) and the Respondents fail to remit a cash amount up to but not exceeding the estimated cost of the remaining Work to be performed, all in accordance with the provisions of Paragraph 88, any unreimbursed costs incurred by EPA in performing Work under the Work Takeover shall be considered Future Response Costs that Respondents shall pay pursuant to Section XV (Payment of Response Costs).

XXI. COVENANT NOT TO SUE BY RESPONDENT

74. Except as provided in Paragraph 76, Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States, or its response action contractors or employees, with respect to the Work, Future Response Costs, Past Response Costs or this Settlement Agreement, including, but not limited to:

- a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;
- b. any claim arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the New Mexico State Constitution, the Navajo Nation Code or the common law of the Navajo Nation, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or
- c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Site.

75.

These covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to the reservations set forth in Paragraphs 72(b), (c), and (e) - (g), but only to the extent that Respondents' claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

76. Notwithstanding the foregoing, nothing in this Settlement Agreement shall be interpreted as waiving, abrogating, or resolving (1) any claims that Respondents have or may have based upon any alleged liability that the United States, including any department thereof, including without limitation the United States Department of Energy and the United States Department of Interior, any agency, branch or division thereof, including without limitation the United States Nuclear Regulatory Commission; or any predecessor or successor agency, has or may have for conditions at the Site pursuant to CERCLA Section 107 or 113, 42 U.S.C. §§ 9607 or 9613; or the Price-Anderson Act of 1957, 42 U.S.C. §§ 2014, 2210 and 2282a, which amended the Atomic Energy Act, 42 U.S.C. 2011 et seq.; or (2) any claims with respect to the Work, Future Response Costs, or this Settlement Agreement that Respondents may have against the United States pursuant to any contract between Respondents and the United States.

77. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXII. OTHER CLAIMS

78. By issuance of this Settlement Agreement, the United States and EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent. The United States or EPA shall not be deemed a party to any contract entered into by Respondents or their directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement Agreement.

79. Except as expressly provided in Section XIX (Covenant Not to Sue by EPA), nothing in this Settlement Agreement constitutes a satisfaction of or release from any claim or cause of action against Respondents or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

80. No action or decision by EPA pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXIII. CONTRIBUTION

81. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and that Respondents are entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), or as may be otherwise provided by law, for "matters addressed" in this Settlement Agreement. The "matters addressed" in this Settlement Agreement are the Work, Past Response Costs and Future Response Costs.

82. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B), pursuant to which Respondents have, as of the Effective Date, agreed to resolve their liability to the United States for the Work, Past Response Costs and Future Response Costs.

83. Nothing in this Settlement Agreement precludes the United States or Respondents from asserting any claims, causes of action, or demands for indemnification, contribution, or cost recovery against any persons not parties to this Settlement Agreement. Nothing herein diminishes the right of the United States, pursuant to Sections 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2)-(3), to pursue any such persons to obtain additional response costs or response action and to enter into any settlements that give rise to contribution protection pursuant to Section 113(f)(2).

XXIV. INDEMNIFICATION

84. Respondents shall indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondents agree to pay the United States all costs incurred by the United States, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement Agreement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondents in carrying out activities pursuant to this Settlement Agreement. Neither Respondents nor any such contractor shall be considered an agent of the United States.

85. The United States shall give Respondents notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondents prior to settling such claim.

86. Respondents waives all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States arising from or on account of any contract, agreement, or arrangement between Respondents and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Respondents shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Respondents and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

XXV. INSURANCE

87. At least 7 days prior to commencing any on-Site work under this Settlement Agreement, Respondents shall secure, and shall maintain for the duration of this Settlement Agreement, comprehensive general liability insurance and automobile insurance with limits of one million dollars, combined single limit. Within the same time period, Respondents shall provide EPA with certificates of such insurance and a copy of each insurance policy. In addition, for the duration of the Settlement Agreement, Respondents shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Respondents in furtherance of this Settlement Agreement. If Respondents demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in an equal or lesser amount, then Respondents need provide only that portion of the insurance described above which is not maintained by such contractor or subcontractor.

XXVI. PERFORMANCE GUARANTEE

88. In order to ensure the full and final completion of the Work, Respondents shall establish and maintain a Performance Guarantee for the benefit of EPA in the amount of \$5,000,000 (hereinafter "Estimated Cost of the Work") in one or more of the following forms, which must be satisfactory in form and substance to EPA:

- a. A surety bond unconditionally guaranteeing payment and/or performance of the Work that is issued by a surety company among those listed as acceptable sureties on Federal bonds as set forth in Circular 570 of the U.S. Department of the Treasury;
- b. One or more irrevocable letters of credit, payable to or at the direction of EPA, that is issued by one or more financial institution(s) (i) that has the authority to issue letters of credit and (ii) whose letter-of-credit operations are regulated and examined by a U.S. Federal or State agency;
- c. A trust fund established for the benefit of EPA that is administered by a trustee (i) that has the authority to act as a trustee and (ii) whose trust operations are regulated and examined by a U.S. Federal or State agency;
- d. A policy of insurance that (i) provides EPA with acceptable rights as a beneficiary thereof; and (ii) is issued by an insurance carrier (a) that has the authority to issue insurance policies in the applicable jurisdiction(s) and (b) whose insurance operations are regulated and examined by a State agency;
- e. A demonstration by Respondents that Respondents meet the financial test criteria of 40 C.F.R. § 264.143(f) with respect to the Estimated Cost of the Work, provided that all other requirements of 40 C.F.R. § 264.143(f) are satisfied; or
- f. A written guarantee to fund or perform the Work executed in favor of EPA by Respondent GE, an indirect parent company of Respondent UNC,.

89. If at any time during the effective period of this Settlement Agreement, the Respondents provide a Performance Guarantee for completion of the Work by means of a demonstration or guarantee pursuant to Paragraph 88(e) above, Respondents shall also comply with the other relevant requirements of 40 C.F.R. § 264.143(f), 40 C.F.R. § 264.151(f), and 40 C.F.R. § 264.151(h)(1) relating to these methods unless otherwise provided in this Settlement Agreement, including but not limited to (i) the initial submission of required financial reports and statements from the relevant entity's responsible corporate official and independent certified public accountant; (ii) the annual re-submission of such reports and statements within ninety days after the close of each such entity's fiscal year; and (iii) the notification of EPA within ninety days after the close of any fiscal year in which such entity no longer satisfies the financial test requirements set forth at 40 C.F.R. § 264.143(f)(1). For purposes of the Performance Guarantee methods specified in this Section, references in 40 C.F.R. Part 264, Subpart H, to "closure,"

“post-closure,” and “plugging and abandonment” shall be deemed to refer to the Work required under this Settlement Agreement, and the terms “current closure cost estimate” “current post-closure cost estimate,” and “current plugging and abandonment cost estimate” shall be deemed to refer to the Estimated Cost of the Work.

90. In the event that EPA determines at any time that a Performance Guarantee provided by Respondents pursuant to this Section is inadequate or otherwise no longer satisfies the requirements set forth in this Section, whether due to an increase in the estimated cost of completing the Work or for any other reason, or in the event that Respondents become aware of information indicating that a Performance Guarantee provided pursuant to this Section is inadequate or otherwise no longer satisfies the requirements set forth in this Section, whether due to an increase in the estimated cost of completing the Work or for any other reason, Respondents, within thirty days of receipt of notice of EPA's determination or, as the case may be, within thirty (30) days of Respondents becoming aware of such information, shall obtain and present to EPA for approval a proposal for a revised or alternative form of Performance Guarantee listed in Paragraph 88 of this Settlement Agreement that satisfies all requirements set forth in this Section XXVI. In seeking approval for a revised or alternative form of Performance Guarantee, Respondents shall follow the procedures set forth in Paragraph 92(b)(ii) of this Settlement Agreement. Respondents' inability to post a Performance Guarantee for completion of the Work shall in no way excuse performance of any other requirements of this Settlement Agreement, including, without limitation, the obligation of Respondents to complete the Work in strict accordance with the terms hereof.

91. The commencement of any Work Takeover pursuant to Paragraph 73 of this Settlement Agreement shall trigger EPA's right to receive the benefit of any Performance Guarantee(s) provided pursuant to Paragraph 88, and at such time EPA shall have immediate access to resources guaranteed under any such Performance Guarantee(s), whether in cash or in kind, as needed to continue and complete the Work assumed by EPA under the Work Takeover. If for any reason EPA is unable to promptly secure the resources guaranteed under any such Performance Guarantee(s), whether in cash or in kind, necessary to continue and complete the Work assumed by EPA under the Work Takeover, or in the event that the Performance Guarantee involves a demonstration of satisfaction of the financial test criteria pursuant to Paragraph 88(e), Respondents shall immediately upon written demand from EPA deposit into an account specified by EPA, in immediately available funds and without setoff, counterclaim, or condition of any kind, a cash amount up to but not exceeding the estimated cost of the remaining Work to be performed as of such date, as determined by EPA.

92. Modification of Amount and/or Form of Performance Guarantee

a. Reduction of Amount of Performance Guarantee. If Respondents believe that the estimated cost to complete the remaining Work has diminished below the amount set forth in Paragraph 88 above, Respondents may, on any anniversary date of entry of this Settlement Agreement, or at any other time agreed to by the Parties, petition EPA in writing to request a reduction in the amount of the Performance Guarantee provided pursuant to this Section so that the amount of the Performance Guarantee is equal to the estimated cost of the remaining Work to be performed. Respondents shall submit a written proposal for such reduction to EPA that shall

specify, at a minimum, the cost of the remaining Work to be performed and the basis upon which such cost was calculated. In seeking approval for a revised or alternative form of Performance Guarantee, Respondents shall follow the procedures set forth in Paragraph 92(b)(ii) of this Settlement Agreement. If EPA decides to accept such a proposal, EPA shall notify the petitioning Respondents of such decision in writing. After receiving EPA's written acceptance, Respondents may reduce the amount of the Performance Guarantee in accordance with and to the extent permitted by such written acceptance. In the event of a dispute, Respondents may reduce the amount of the Performance Guarantee required hereunder only in accordance with a final administrative or judicial decision resolving such dispute. No change to the form or terms of any Performance Guarantee provided under this Section, other than a reduction in amount, is authorized except as provided in Paragraphs 88 or 90 of this Settlement Agreement.

b. Change of Form of Performance Guarantee.

i. If, after entry of this Settlement Agreement, Respondents desire to change the form or terms of any Performance Guarantee(s) provided pursuant to this Section, Respondents may, on any anniversary date of entry of this Settlement Agreement, or at any other time agreed to by the Parties, petition EPA in writing to request a change in the form of the Performance Guarantee provided hereunder. The submission of such proposed revised or alternative form of Performance Guarantee shall be as provided in subparagraph (b)(ii) of this paragraph. Any decision made by EPA on a petition submitted under this subparagraph (b)(i) shall be made in EPA's sole and unreviewable discretion, and such decision shall not be subject to challenge by Respondents pursuant to the dispute resolution provisions of this Settlement Agreement or in any other forum.

ii. Respondents shall submit a written proposal for a revised or alternative form of Performance Guarantee to EPA which shall specify, at a minimum, the estimated cost of the remaining Work to be performed, the basis upon which such cost was calculated, and the proposed revised form of Performance Guarantee, including all proposed instruments or other documents required in order to make the proposed Performance Guarantee legally binding. The proposed revised or alternative form of Performance Guarantee must satisfy all requirements set forth or incorporated by reference in this Section. Respondents shall submit such proposed revised or alternative form of Performance Guarantee to the OSCs in accordance with Paragraph 24 of this Settlement Agreement, with a copy to Harrison Karr, Assistant Regional Counsel, USEPA Region 9, Mail Code ORC-3, 75 Hawthorne St., San Francisco CA 94105. EPA shall notify Respondents in writing of its decision to accept or reject a revised or alternative Performance Guarantee submitted pursuant to this subparagraph. Within ten days after receiving a written decision approving the proposed revised or alternative Performance Guarantee, Respondents shall execute and/or otherwise finalize all instruments or other documents required in order to make the selected Performance Guarantee(s) legally binding in a form substantially identical to the documents submitted to EPA as part of the proposal, and such Performance Guarantee(s) shall thereupon be fully effective. Respondents shall submit all executed and/or otherwise finalized instruments or other documents required in order to make the selected Performance Guarantee(s) legally binding to the EPA Regional Financial Management Officer within thirty days of receiving a written decision approving the proposed revised or alternative

Performance Guarantee in accordance with Paragraph 24 of this Settlement Agreement, with a copy to Harrison Karr, Assistant Regional Counsel, USEPA Region 9, Mail Code ORC-3, 75 Hawthorne St., San Francisco CA 94105.

c. Release of Performance Guarantee. If Respondents receive written notice from EPA in accordance with Section XXVIII (Notice of Completion of Work) that the Work has been fully and finally completed in accordance with the terms of this Settlement Agreement, or if EPA otherwise so notifies Respondents in writing, Respondents may thereafter release, cancel, or discontinue the Performance Guarantee(s) provided pursuant to this Section. Respondents shall not release, cancel, or discontinue any Performance Guarantee provided pursuant to this Section except as provided in this subparagraph. In the event of a dispute, Respondents may release, cancel, or discontinue the Performance Guarantee(s) required hereunder only in accordance with a final administrative or judicial decision resolving such dispute.

XXVII. MODIFICATIONS

93. The OSC may make modifications to any plan or schedule in writing or by oral direction, provided such modifications do not materially expand the scope of the Work Plan. Any oral modification will be memorialized in writing by EPA promptly and provided to Respondents and the Navajo Nation, but shall have as its effective date the date of the OSCs oral direction to Respondents' representative. Any other requirements of this Settlement Agreement may be modified in writing by mutual agreement of the parties. EPA and Respondents may agree to modify the Work Plan to include additional response actions to address Red Water Pond Road after completion of the investigation.

94. If Respondents seek permission to deviate from any approved work plan or schedule Respondents' Project Coordinator shall submit a written request to EPA for approval outlining the proposed modification and its basis. Respondents may not proceed with the requested deviation until receiving oral or written approval from the OSC pursuant to paragraph 93.

95. No informal advice, guidance, suggestion, or comment by the OSC or other EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondents shall relieve Respondents of their obligation to obtain any formal approval required by this Settlement Agreement, or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

XXVIII. NOTICE OF COMPLETION OF WORK

96. When EPA determines, after consultation with NNEPA, and after EPA's review of the Final Report, that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including payment of Future Response Costs or record retention, EPA will provide written notice to Respondents. If EPA determines, after consultation with NNEPA, that any such Work has not been completed in accordance with this Settlement Agreement, EPA will notify Respondents, provide a list of the deficiencies, and require that Respondents correct such deficiencies. Respondents shall correct the deficiencies and shall submit a modified Final Report

in accordance with the EPA notice. Failure by Respondents to correct the deficiencies as directed by EPA shall be a violation of this Settlement Agreement.

XXIX. SEVERABILITY, INTEGRATION and APPENDICES

97. If a court issues an order that invalidates any provision of this Settlement Agreement or finds that Respondents have sufficient cause not to comply with one or more provisions of this Settlement Agreement, Respondents shall remain bound to comply with all provisions of this Settlement Agreement not invalidated or determined to be subject to a sufficient cause defense by the court's order.

98. This Settlement Agreement and its appendices constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement Agreement. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following appendices are attached to and incorporated into this Settlement Agreement:

Appendix A: Maps of Site and Vicinity

Appendix B: Action Memorandum dated July 23, 2009 ("Action Memo")

Appendix C: Approved Work Plan

XXX. EFFECTIVE DATE

99. This Settlement Agreement shall be effective upon signature by the Assistant Director of the Superfund Division, U.S. EPA Region 9 or her delegatee.

The undersigned representative(s) of Respondents and each of them certify that s/he are fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the party s/he represents to this document.

Agreed this ____ day of _____, 2009.

For Respondent United Nuclear Corporation

BY: _____

(Print/Type Name) _____

(Title) _____

Agreed this 24 day of July, 2009.

For Respondent General Electric Company

BY: Jane W Gardner

(Print/Type Name) Jane W Gardner

(Title) Senior Counsel Strategic Advisor
GE Corporate Environmental Programs

The undersigned representative(s) of Respondents and each of them certify that s/he are fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the party s/he represents to this document.

Agreed this 24 day of July, 2009.

For Respondent United Nuclear Corporation

BY: Stephen D. Hill
(Print/Type Name) Stephen D. Hill
(Title) President

Agreed this ____ day of _____, 2009.

For Respondent General Electric Company

BY: _____
(Print/Type Name) _____
(Title) _____

It is so ORDERED and Agreed this 24th day of July, 2009.

BY: Elizabeth Adams

Assistant Director, Superfund Division
Partnerships, Land Revitalization & Cleanup Branch
U.S. Environmental Protection Agency, Region 9

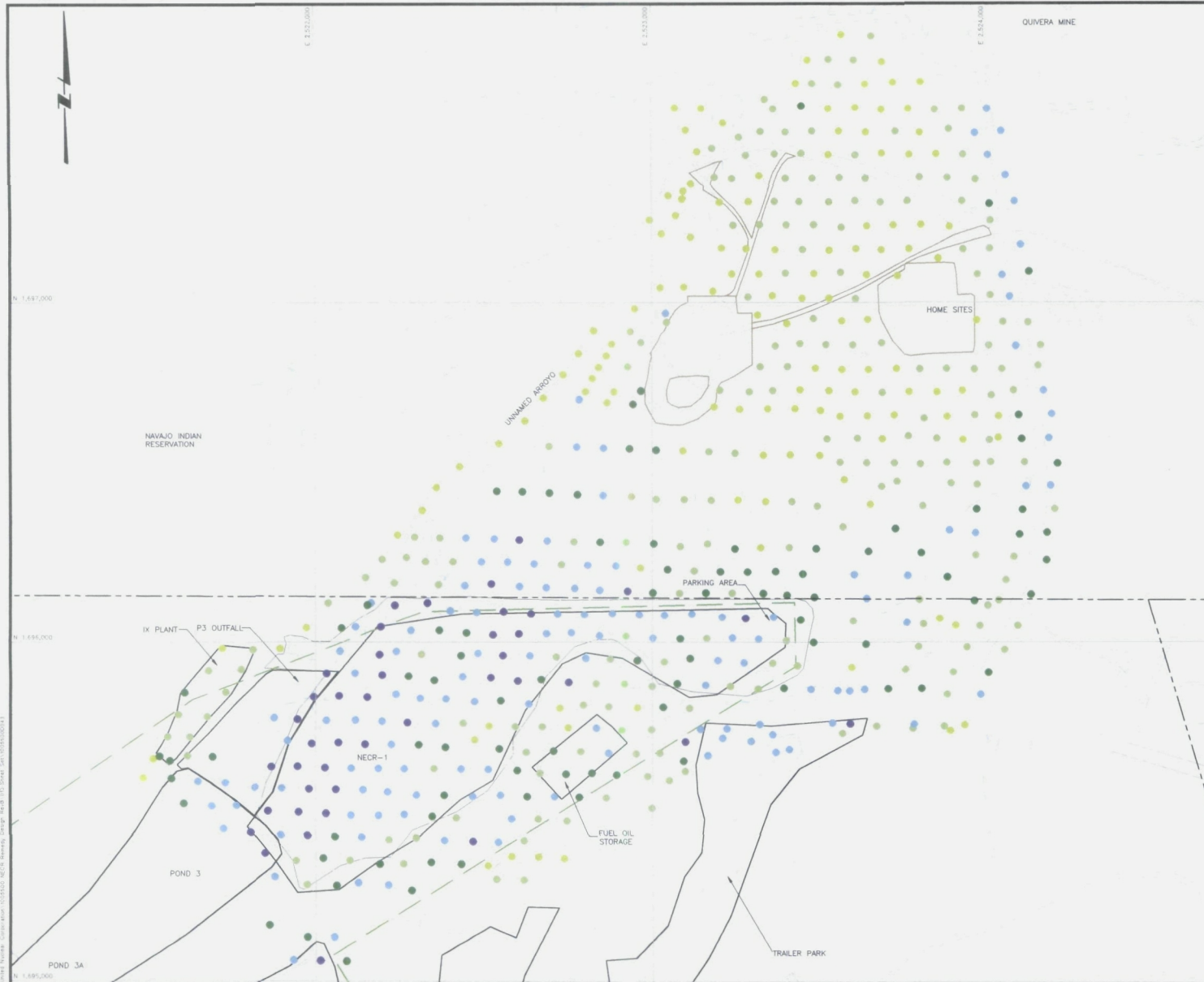
ELIZABETH J ADAMS

APPENDIX A
TO
ADMINISTRATIVE ORDER ON CONSENT
NORTHEAST CHURCH ROCK INTERIM REMOVAL ACTION
CERCLA DOCKET NO. 2009-11



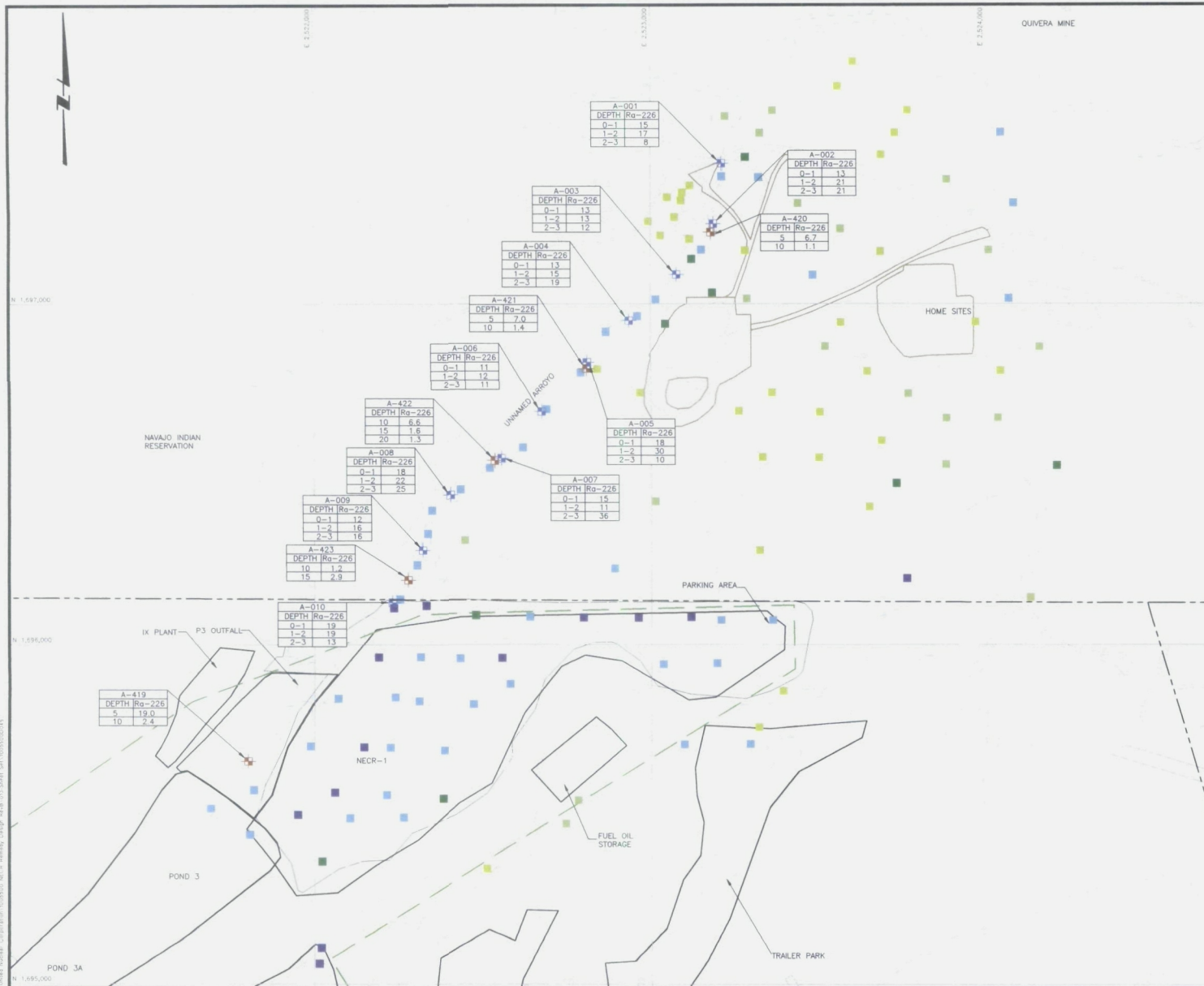
DISCLAIMER THIS DRAWING AND DEVELOPMENT THROUGH THE APPLICATION OF PROFESSIONAL ENGINEERING SKILL AND PROPRIETARY METHODOLOGIES, PROVIDED FOR YOUR USE OF ANY AND ALL INFORMATION IN THIS DRAWING IS THE PROPERTY OF THE DRAWING AUTHOR. ALL INFORMATION IN THIS DRAWING IS THE PROPERTY OF THE DRAWING AUTHOR. NO PART OF THIS DRAWING SHALL BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF THE DRAWING AUTHOR. THE DRAWING AUTHOR ASSUMES NO LIABILITY FOR ANY DAMAGE, LOSS, OR INJURY, INCLUDING ECONOMIC, ARISING FROM THE USE OF THIS DRAWING. THE USER OF THIS DRAWING SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AUTHORITIES. THE USER OF THIS DRAWING SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AUTHORITIES. THE USER OF THIS DRAWING SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AUTHORITIES.				DRAWING REFERENCES 1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83, US FEET				DESIGNED BY: T. LEESEON 08/20/08 DRAWN BY: E. MARKS 08/20/08 CHECKED BY: T. LEESEON 08/20/08 APPROVED BY: T. LEESEON 08/20/08 PROJECT MANAGER: T. LEESEON 08/20/08 CLIENT APPROVAL: _____ CLIENT REFERENCE NO: _____				PROJECT LOCATION: NORTHEAST CHURCH ROCK MINE PROJECT: INTERIM REMOVAL ACTION WORK PLAN TITLE: SITE LAYOUT FIGURE: 1 OF 4 FILE NAME: 1005500D042				P.O. BOX 3077 Gallup, New Mexico 87305-3077 							
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<p>DISCLAIMER</p> <p>THIS DRAWING WAS DEVELOPED THROUGH THE APPLICATION OF PROFESSIONAL ENGINEERING SKILL AND PROPRIETARY METHODS. CLIENTS, INDUSTRY AND PUBLIC ARE ADVISED THAT THIS DRAWING IS NOT A GUARANTEE OF THE ACCURACY OF THE INFORMATION CONTAINED HEREIN. THE DRAWING IS NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN CONSENT OF THE ENGINEER. ANY ALTERATION OR ADAPTATION OF THIS DRAWING SHALL BE THE RESPONSIBILITY OF THE USER. THE ENGINEER AND PROPRIETARY RIGHTS ARE AT USER'S SOLE RISK AND WITHOUT ANY LIABILITY OF USAR, RESPONSIBILITY OF USER.</p>				<p>DRAWING REFERENCES</p> <p>1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83, US FEET</p>				<p>DESIGNED BY: T. LEESEON 08/20/08</p> <p>DRAWN BY: E. MARKS 08/20/08</p> <p>CHECKED BY: T. LEESEON 08/20/08</p> <p>APPROVED BY: T. LEESEON 08/20/08</p> <p>PROJECT MANAGER: T. LEESEON 08/20/08</p> <p>CLIENT APPROVAL: _____</p> <p>CLIENT REFERENCE NO: _____</p>				<p>UNC</p> <p>P.O. BOX 3077</p> <p> Gallup, New Mexico 87305-3077</p>			
<p>ISSUED FOR REVIEW</p> <p>DESCRIPTION</p>				<p>OF: TL 08/20/08</p> <p>TECH: ENG: DATE</p>				<p>PROJECT LOCATION: NORTHEAST CHURCH ROCK MINE</p> <p>PROJECT: INTERIM REMOVAL ACTION WORK PLAN</p> <p>TITLE: REMOVAL SITE EVALUATION GAMMA ANALYTICAL RESULTS</p>				<p>FIGURE: 2 OF 4</p> <p>REVISION: B</p> <p>FILE NAME: 1005500D043</p>			

<p>PROJECT LOCATION: NORTHEAST CHURCH ROCK MINE</p> <p>PROJECT: INTERIM REMOVAL ACTION WORK PLAN</p> <p>TITLE: REMOVAL SITE EVALUATION GAMMA ANALYTICAL RESULTS</p>				<p>FIGURE: 2 OF 4</p> <p>REVISION: B</p> <p>FILE NAME: 1005500D043</p>			
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<p>DISCLAIMER THIS DRAWING WAS DEVELOPED THROUGH THE APPLICATION OF PROFESSIONAL ENGINEERING SKILL AND PROPRIETARY METHODOLOGIES, PROCESSES AND KNOW HOW OF MWH AS APPLICABLE TO THE TERMS OF A CONTRACTUAL SCOPE OF WORK. ACCORDING TO THE PROVISIONS OF THE CONTRACT, THIS DRAWING IS NOT TO BE USED FOR ANY OTHER PURPOSES WITHOUT THE WRITTEN CONSENT OF MWH. ANY ALTERATION OR DEVIATION OF THIS DRAWING SHALL BE AT THE USER'S SOLE RISK AND WITHOUT ANY LIABILITY OR LEGAL RESPONSIBILITY OF MWH.</p>				<p>USING REFERENCES: 1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83, US FEET</p>				<p>DESIGNED BY: TALESON 08/20/08 DRAWN BY: E.MARKS 08/20/08 CHECKED BY: TALESON 08/20/08 APPROVED BY: TALESON 08/20/08 PROJECT MANAGER: TALESON 08/20/08 CLIENT APPROVAL: CLIENT REFERENCE NO:</p>				<p>UNC P.O. BOX 3077 Gallup, New Mexico 87305-3077</p>			
<p>ISSUED FOR REVIEW</p>				<p>OF 10 08/20/08</p>				<p>PROJECT LOCATION: NORTHEAST CHURCH ROCK MINE</p>				<p>PROJECT: INTERIM REMOVAL ACTION WORK PLAN</p>			
<p>DESCRIPTION</p>				<p>TECH. ENG. DATE</p>				<p>TITLE: REMOVAL SITE EVALUATION SOIL ANALYTICAL RESULTS</p>				<p>FIGURE: 3 OF 4</p>			
<p>FILE NAME</p>				<p>1005500D045</p>				<p>REVISION: B</p>				<p>FILE NAME</p>			

APPENDIX B
TO
ADMINISTRATIVE ORDER ON CONSENT
NORTHEAST CHURCH ROCK INTERIM REMOVAL ACTION
CERCLA DOCKET NO. 2009-11



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

MEMORANDUM

DATE: July 23, 2009

SUBJECT: Request for a Time-Critical Removal Action at the Northeast Church Rock Step-Out Area, McKinley County, New Mexico, Navajo Nation Indian Reservation

FROM: Andrew Bain, Remedial Project Manager
Arizona and Navajo Section (SFD-6-2)

Handwritten signature of Andrew Bain.

THROUGH: Dawn Richmond, Chief
Arizona and Navajo Sites Section (SFD-6-2)

Handwritten signature of Dawn Richmond.

TO: Elizabeth Adams, Assistant Director
Superfund Division
Partnerships, Land Revitalization & Cleanup Branch (SFD-6)

Handwritten signature of Elizabeth Adams.

I. PURPOSE

The purpose of this Action Memorandum is to describe the hazardous conditions at a portion of the Northeast Church Rock Mine ("NECR Mine Site" or "Site") that require the proposed interim response actions ("IRA"), which we anticipate will be performed pursuant to a proposed Administrative Settlement Agreement and Order on Consent with United Nuclear Corporation ("UNC") and General Electric Company ("GE"). This Action Memorandum also seeks approval to spend up to \$300,000 in direct costs to oversee PRP actions to mitigate threats to human health and the environment posed by the presence of hazardous substances at the portion of the NECR Mine at which the IRA will be performed (referred to herein as the "IRA Area"). The proposed IRA would include activities in the following areas of concern prior to implementation of the NECR non-time critical removal action involving the majority of the NECR Mine:

- 1) NECR 1 Pile "Step-Out" Areas;
- 2) Unnamed Arroyo #1;
- 3) NECR 1 Pile regrade and cover; and
- 4) Red Water Pond Road characterization area

The Site is located on the Navajo Nation, on Red Water Pond Road, in Coyote Canyon Chapter, McKinley County, New Mexico.

The proposed removal of hazardous substances would be undertaken pursuant to Section 104(a)(1) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9604(a)(1), and Section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 CFR § 300.415.

II. SITE CONDITIONS AND BACKGROUND

Site Status: Non-NPL
Category of Removal: Time-Critical
CERCLIS ID: NNN000906132
SITE ID: SR

A. IRA Area and Site Description

1. Physical Location

The Site includes the NECR Mine and all areas where hazardous substances from that mining operation have come to be located. A portion of the IRA Area is located on the Navajo Indian Reservation immediately north of Sections 34 and 35, Township 17 North, Range 16 West in McKinley County, New Mexico. Another portion of the IRA Area is located south of the Reservation boundary and includes the NECR1 Pile and the sedimentation ponds. The IRA Area also includes approximately a 2,000 foot segment of Red Water Pond Road (RWPR) north of the intersection with State Highway 566, as well as the immediately vicinity of this segment of the road. The IRA area and the Site are situated approximately 20 miles northeast of Gallup, McKinley County, New Mexico. See Figure 1 for Site Location Maps.

2. IRA Area Characteristics

The IRA Area consists of an "arroyo" (an intermittent water course), the NECR1 "Step-Out" Areas (soils north and northeast of the 125-acre NECR Mine permit boundary), RWPR and the NECR 1 Pile (see Figure 1). The IRA Area is located primarily within the Navajo Nation Reservation, bounded to the east-northeast by RWPR, north of Sections 35 and 36 and north of NM Rt. 566. A portion of the IRA Area, the NECR 1 Pile area, is located on the mine lease on Section 35, which is Tribal Trust land.

The Unnamed Arroyo #1 ("Arroyo") is situated north-northeast of the former NECR uranium mine. It drains west to east from the Boneyard/Non Economic Material Storage Area to its discharge point into a second, unnamed arroyo (Unnamed Arroyo #2) past the residential area. The Step-Out Area extends approximately 1,000 feet east from the NECR-1 "Step-Out" boundary, and includes Red Water Pond Road to the east.

Contaminated material originating from the NECR Mine has been observed in the Arroyo sediments and has migrated to the step-out areas surrounding several homesites. The four homesites situated within or near the IRA Area were the focus of a Time Critical Removal Action in summer 2007 to remove and dispose of surface soils. At that time, approximately one-half acre was scraped around each homesite. In Figure 4, the un-shaded areas surrounded by the tan fill indicate the previous EPA-mitigated areas or the areas found to be below the Action Level. The NECR mine lease occupies 125 acres and is situated approximately 1/4 mile south-southwest of the homesites.

The NECR mine is a historic uranium mine and it is considered to be the major source of the soil contamination at the Site. United Nuclear Corporation (UNC) operated the mine from 1968-1982, serving as the principal mineral source for the UNC uranium mill facility, located adjacent to the NECR Mine. The UNC mill facility is a National Priority List site, co-managed by U.S. EPA Region 6 and the Nuclear Regulatory Commission (NRC).

The NECR mine consists of two shafts, two uranium ore waste piles, several mine vent holes and a production well developed at approximately 1,800 feet used to dewater the mine workings during operations. The northwest portion of the NECR Mine, representing a steep 30 to 40 foot face reportedly constructed of mining overburden, is partially located within the Arroyo. The Arroyo travels through the Site between several residences.

The Site is believed to be impacted by wind and water erosion from the NECR Mine during weather events. Both historical sampling, the Removal Site Evaluation (RSE) sampling and Supplemental RSE (SRSE) investigations indicate that elevated levels of Radium-226 are present throughout the NECR Mine area (see Attachment II).

The Arroyo, the NECR1 Step-Out area and RWPR are downgradient and downwind (based on the prevailing wind) from the NECR mine. Another former uranium mine (NE Church Rock I or Quivira, originally operated by Kerr-McGee Corp.) was situated in close proximity to the Site. Materials were reportedly dispersed on RWPR by the haul trucks on their way to the Kerr McGee mill or the road bed may be constructed of waste ore. See Attachment III for the Site Photolog.

Analyses conducted in accordance with the Quality Assurance Project Plan (QAPP) were presented in the RSE Work Plan (MWH, 2006). The SRSE also included 195 static gamma radiation level measurements in the area north of NECR-1 to supplement the 149 step-out static gamma radiation measurements performed during the RSE.

Pursuant to the agreed-upon SRSE work plan, the supplemental gamma radiation survey at NECR-1 extended to boundary delineation as follows:

- To the Unnamed Arroyo #1, to the west;

- To the east-west trending Unnamed Arroyo #2, to the North; and
- To one row of measurements immediately east of Red Water Pond Road.

3. Removal Site Evaluation and Supplemental Removal Site Evaluation

UNC, a Potentially Responsible Party (PRP), conducted the RSE at the NECR Mine with U.S. EPA and NNEPA oversight. In addition to the NECR Mine area, the RSE included soil sampling and analyses of the Arroyo sediments, the residential Step-Out areas and RWPR. Field sampling activities began at the Site in November 2006, conducted by MWH, Inc., as consultants to the PRP. MWH collected additional field sampling in November 2007 and April 2008. The work plan was developed and executed pursuant to an Administrative Order on Consent (AOC) between U.S. EPA and the PRP.

MWH collected analytical samples and conducted gamma surveys during the RSE and SRSE field investigations. The gamma survey consisted of static direct gamma radiation level measurements (gamma survey). This gamma survey method provides the aerial distribution of Ra-226 concentrations in the top six inches of the soil column and allows greater characterization of the areas compared to relying on surface soil sampling alone. The survey was conducted as described in Section 5.3.3 of the RSE Work Plan and is consistent with MARSSIM guidance.

The gamma survey measurements were collected at 80-foot triangular grid nodes cast on a random origin in accordance with MARSSIM, using the same protocol as the other survey areas specified in the RSE Work Plan. The locations of the gamma survey points are shown on Figure 2, *Static Gamma Measurement Locations*. In the area north of NECR-1, the gamma survey was extended west to the Unnamed Arroyo #1, north to the second unnamed arroyo that runs east-west (Unnamed Arroyo #2), and east to the side of Red Water Pond Road. The areas around the homesites where U.S. EPA conducted removal actions were excluded from the gamma survey, as shown on Figure 3, based on U.S. EPA's confirmation sample results. Details of the instrumentation configuration and Standard Operating Procedures (SOPs) are described in the RSE Work Plan.

Surface soil sampling was also conducted in the three survey areas included in the SRSE. Surface soil samples were collected at approximately 20 percent of the gamma survey points and collected manually as grab samples from 0 to 0.5 feet below ground surface (bgs), as per the RSE Work Plan (MWH, 2006). The locations of the surface soil samples are shown on Figure 3, *Surface Soil Sample Locations*. The samples were submitted to Energy Laboratories, Inc. and analyzed for:

- Radium-226 by U.S. EPA Method 901.1; and
- Total uranium by U.S. EPA Method 6020/200.8.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

The residential Preliminary Remediation Goal (PRG) for radium-226 is 0.0124 Pico Curies per gram (pCi/g). The field screening level (FSL) for the Site was 2.24 pCi/g. The Site screening level is the sum of the Site-specific background mean and a risk-based value representing the upper end of the risk range (i.e., the 1 in 10,000 excess cancer risk for radium in residential exposure scenarios). The Site specific background mean was 1.0 pCi/g and the risk-based value was 1.24 pCi/g¹. The entire RSE and SRSE datasets are included as Attachment II.

NECR1 Pile Step-Out Area: 41 samples were collected from the area. Radium concentrations ranged from 0.7 to 28.5 pCi/g (average 4.7 pCi/g); 20 out of 36 primary samples (55%) exceeded the FSL.

Unnamed Arroyo #1: 15 surface soil samples were collected from the Unnamed Arroyo #1 during the correlation sampling in August 2006, and analyzed for Ra-226. Ra-226 ranged from 9.7 to 26.4 pCi/g (averaged 16.8 pCi/g); 100% exceeded the FSL. Ten hand auger holes were advanced each to 3 feet bgs from the edge of NECR-1 to near the confluence with the next arroyo. Ra-226 concentrations ranged from 8.4 to 35.7 pCi/g (average 16.4 pCi/g); all 30 samples exceeded the FSL.

Four additional borings were conducted in the Unnamed Arroyo in April 2008; one advanced to 45 feet bgs. Ra-226 ranged from 1.1 to 7.0, found at a maximum depth of 15 feet. The RSE and SRSE results indicate that soils in excess of the FSL are present to approximately 6 feet bgs at the downstream end of the Unnamed Arroyo #1 to approximately 16 feet bgs near NECR-1 (bgs referring to the bottom of the existing arroyo channel). Observations of the lithologies during drilling indicate that bedrock is present from approximately 25 feet bgs at the downstream end to approximately 45 feet bgs near NECR-1.

Red Water Pond Road: According to the SRSE report, 100% of the gamma radiation measurements (Ra-226 equivalent) performed adjacent to the east and west sides of Red Water Pond Road, as well as the surface soil samples (Ra-226) collected adjacent to the road exceeded the field screening level (FSL) of 2.24 pCi/g. Elevated Ra-226 in soils near and beneath Red Water Pond Road may be associated with the historical use of this road as a haul road for former mine located to the north of the NECR Mine. Due to the proximity of NECR to the southern portion of RWPR and based on local drainage patterns in this area, past operations at the NECR Mine could have caused some impacts. Additional characterization of RWPR is required to assess the scope of future removal activities.

Background: It is notable that the Site-specific background level was determined based on a background survey conducted on August 17, 2006. On that

¹ The residential PRG is 0.0124 pCi/g. This represents the 1 in 1,000,000 risk and is below the analytical detection limit (0.1 pCi/g). EPA policy states that a 1 in 10,000 risk is acceptable as a Removal Action objective, therefore, the PRG was scaled up to the 1 in 10,000 risk range to give a risk-based value of 1.24 pCi/g.

date, 25 surface soil samples were collected from an area located southwest of the NECR Mine. The area was judged to be un-impacted by mining activities and situated upwind from the NECR Mine. The Technical Memorandum background report is included in the Site Administrative Record.

5. NPL status

The NECR Mine is not separately listed on the National Priorities List (NPL). However, the NECR Mine Site is adjacent to the UNC NPL site, and contamination from the mill operations have been disposed on the mine site, and contamination from the mine operations have come to be located at the mill site. In 2006, Navajo Superfund Program conducted a pre-CERCLIS site screening of the NECR Mine (CERCLIS ID No. NNN000906132). The RSE Work Plan determined the need for investigation of the Step-Out Area, and EPA ultimately included the Step-Out area in studies and planning for removal actions at the NECR Mine.

Current conditions at the Site pose an imminent and substantial endangerment (see Sections III and IV) at the Step-Out Area. The proposed Interim Removal Action is expected to complete work at the NECR Step-Out area and Unnamed Arroyo #1 (subject to verification in the Final Status Survey for the full NECR Mine), but will not complete work at the NECR Mine Site, including 125-acre NECR Mine, Red Water Pond Road or other impacted areas.

B. Other Actions to Date

The NECR Residential Removal #1 and #2 occurred at or in the vicinity of the Site in summer 2007. No other CERCLA response actions have occurred at the Site to date. Federal Nuclear Regulatory Commission remedial actions have taken place at the NECR Mine.

Region 9 is in the process of performing an Engineering Evaluation/Cost Analysis ("EE/CA") for the NECR Mine. The proposed EE/CA has been issued for public comment. Public comment was originally set for 30 days, but at the request of the public, has been expanded to 90 days. All comments will be due by September 9, 2009.

C. State and Local Authorities Roles

1. State and local actions to date

No State actions have taken place at the Site; however, some of the State and Tribal actions at the NECR Mine may be relevant to the Site. NNEPA sent a letter to U.S. EPA Region 9 formally requesting that U.S. EPA become the lead agency for the NECR Mine, per a Memorandum of Understanding between Region 9 and the Navajo Nation. Consultations with the State of New Mexico and Navajo Nation in 2005 resulted in correspondence that referred the lead to Region 9. Region 9 issued a letter formally

accepting lead for the NECR Mine on November 7, 2005. Because the Site is a portion of the larger NECR Mine, these discussions satisfy the regulatory requirement of State and Tribal referral.

NNEPA provided U.S. EPA with written correspondence agreeing to the Interim Removal Action Work Plan dated July 15, 2009. A copy of this correspondence will be included in the Administrative Record.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Current Site conditions pose the threat of potential future releases of a hazardous substance, namely radium-226. The likelihood of direct human exposure, via ingestion and/or inhalation of hazardous substances, and the threat of potential future releases and migration of those substances, pose an imminent and substantial endangerment to public health, and/or welfare, or the environment based on the factors set forth in the NCP, 40 CFR § 300.415(b)(2). These factors include:

1. Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations or the food chain

As described in Section II.A.4, high concentrations of radium-226 have been detected in samples of residential soils at the Site. Radium is formed when uranium and thorium break down in the environment. Two of the main radium isotopes found in the environment are radium-226 and radium-228. During the decay process, alpha, beta, and gamma radiation are released. Radium may be found in air and water. Radium in the soil may be absorbed by plants.

Analytical results indicate that concentrations of radium-226 identified in these media exceed background and U.S. EPA's PRGs. Acute inhalation exposure to high levels of radium can cause adverse effects to the blood (anemia) and eyes (cataracts). It also has been shown to affect the teeth, causing an increase in broken teeth and cavities. Exposure to high levels of radium results in an increased incidence of bone, liver, and breast cancer. The U.S. EPA and the National Academy of Sciences, Committee on Biological Effects of Ionizing Radiation, has stated that radium is a known human carcinogen (ATSDR, 1999). Inhalation of radium contaminated particulates is of particular concern. Radium emits alpha radiation, which, when inhaled, becomes a source of ionizing radiation in the lung and throat, possibly leading to toxic effects.

Much of the contaminated material in the Site is fine-grained and therefore likely to result in human exposure via inhalation or ingestion. Contamination is readily accessible to on-site full-time residents and potentially nearby part-time and/or full-time residents. Persons occupying or traversing the Site may be exposed to contaminated dust by inhalation or ingestion of contamination sorbed to particulate matter. Incidences of direct contact with natural and mechanically generated dust during these activities account for known contamination exposure scenarios faced at the Site. Radium-226

may be entrained in naturally and mechanically generated dust and/or transported on shoes and clothing of residents passing over contaminated areas. Gardening and other yard work also may result in exposure to contamination.

Activities that occur in contaminated areas that may put persons at risk include walking or hiking, livestock grazing, and modes of transportation including all-terrain vehicle, motorcycle, or on-horseback. Persons may drive their vehicles over contaminated areas as well. This activity may also contribute to exposure pathways via dust generation. Contamination in yards where children play may also be ingested. Children may eat contaminated soils during play activities.

2. High levels of hazardous substances in soils at or near the surface that may migrate

Contaminated soils from the Site may migrate off-site via wind and water transport mechanisms including mechanical dust generation. It is believed that radium in soils at the homesites was transported there from sources including the upgradient NECR Mine. It is likely that this contamination could continue to migrate beyond the Site boundary. Some of the radium daughter particles, such as radon, also have a specific tendency to adhere to dust particles and migrate and may have traveled off-site in historic surface water flows.

3. Weather conditions that may cause hazardous substances to migrate or be released

Rainfall events may lead to transport of the contamination from the mine to areas of concern and the homesites. High soil erosion rates may indicate transport of contamination from the Site constituting a release of hazardous substances and resulting in secondary contamination sources. In addition, contaminants may migrate during high wind events due to the propensity for contaminants to adhere to windborne dust particles.

4. Availability of other appropriate federal or state response mechanisms to respond to the release

The NNEPA has informed U.S. EPA that it does not have the authority or resources to address the Site. Further, the NNEPA has sent a formal request to U.S. EPA, requesting that U.S. EPA address this area through a Time-Critical Removal Action. The State of New Mexico has also deferred the Site to EPA.

IV. ENDANGERMENT DETERMINATION

Actual and threatened releases of hazardous substances from this site, if not addressed by implementing a Time-Critical Removal Action, may continue to present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

U.S. EPA will direct UNC and GE through an Administrative Settlement Agreement and Order on Consent pursuant to Sections 104, 106a, 107 and 122 of CERCLA to conduct response actions. U.S. EPA proposes to conduct technical oversight of UNC and GE. Work will consist of the following activities:

1. Proposed action description

U.S. EPA proposes to mitigate the imminent and substantial threats to human health, welfare, or the environment by taking steps to prevent the release of radium-226. The removal action will include the following objectives to prevent direct human contact with environmental radium-226 in arroyo sediments, Step-Out area soils and RWPR (see Figure 4):

Excavation: Remove soils containing Radium 226 (Ra-226) above 2.24 pCi/g (hereafter referred to as the IRA Action Level) from Navajo Reservation lands that are potentially attributable to historic activities at the NECR Mine. Scope includes surficial contamination from the NECR1 Step-Out areas and surficial and subsurface sediment contamination to native soil in the Unnamed Arroyo #1. Conduct confirmation scanning prior to backfilling. Conduct confirmation sampling at a 5% frequency and a minimum of 20 samples prior to backfilling. The IRA does not include a Final Status Survey. A Final Status Survey will be conducted for the entire NECR Mine Site, including the IRA Area, according to MARSSIM guidance, at the conclusion of the response actions selected pursuant to the EE/CA.

Regrading/Waste Deposition/Cover/Drainage: Reclaim the side-slopes of the NECR-1 pad to prevent transport of impacted materials via wind and storm water, place newly excavated soil and sediment on the waste pile, and regrading and covering with clean fill of the NECR-1 waste pile to reduce the chances of drainage of contaminants onto the side slopes and to convey surface drainage into the area designated as Pond 3.

Erosion/Sediment Control: Install erosion and sedimentation controls on the periphery of the north portion of the NECR Mine adjacent to the Navajo Reservation Boundary to prevent transport of potentially impacted material onto the reservation via stormwater (i.e., the unnamed arroyo and the drainage northeast of NECR-1). This will include installing sedimentation basins at the top of the unnamed arroyo on the NECR Mine and within the drainage channel from the northeast portion of the site that drains towards the southern part of Red Water Pond Road. Regrading will be done to redirect runoff to the sediment basin

Temporary Relocation and Services: provide temporary relocation and temporary relocation services for residents of three homesites on the reservation lands in proximity

to the Work pursuant to U.S. EPA's Temporary Relocation guidance and consistent with U.S. EPA's previous experience with the Residential Removal Action.

Investigation: investigate the segment of Red Water Pond Road from the intersection of that road with State Highway 566 and north to unnamed Arroyo #2 (approximately 2,000 feet), as well as the immediate vicinity surrounding it to determine which portions of this area are in need of remediation,

Revegetation: backfill with clean fill, as necessary and revegetate areas impacted by the Interim Remedial Action,

Health & Safety: Implement the Work in a safe manner that is protective of site personnel as well as residents. UNC will offer temporary lodging to three households located in the immediate work area during implementation of the IRA.

Excavation and removal of contaminated soils will achieve the ultimate goal of reducing the radium concentration in the excavation footprint to a concentration that is less than the Site screening level.

2. Contribution to remedial performance

This removal action is expected to complete clean-up activities associated with the NECR Step-Out Site. A subsequent, non-time critical removal action is planned to address the remainder of radium contaminated soils and sediments at the NECR Mine.

The long-term cleanup plan for the site:

It is expected that this removal action will eliminate any threat of direct or indirect contact with or inhalation of hazardous substances at the Step-Out Area addressed in this removal. As discussed below, U.S. EPA expects to conduct subsequent response actions at the larger NECR Mine Site following issuance of the EE/CA, including a Site-wide Final Status Survey.

Threats that will require attention prior to the start of a long-term cleanup:

USEPA has identified imminent threats posed by radium-226 contamination at the NECR1 Step-Out Area Site. The mitigation actions described above will constitute a permanent remedy for the Site.

Sources of the contamination may require long-term cleanup. In future actions, these sources will comprise the NECR Mine. USEPA will continue to coordinate with NNEPA to evaluate the risk of human health effects based on mine wastes exposure pathways that may be present at the NECR Mine. The RSE that was conducted in

November 2006, and the Supplemental RSE completed April 2008, constitute the basis for further action at the NECR Mine Site.

The extent to which the removal will ensure that threats are adequately abated:

The removal of surficial hazardous substances contamination by excavation and disposal will abate the threats described in Section III.

Consistency with the long-term remedy:

The Time-Critical Removal proposed for the Site is consistent with addressing the larger issue of potential exposures posed by the NECR Mine.

3. Applicable or relevant and appropriate requirements (ARARs)

Section 300.415(j) of the NCP provides that removal actions must attain ARARs to the extent practicable, considering the exigencies of the situation.

Section 300.5 of the NCP defines applicable requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site.

Section 300.5 of the NCP defines relevant and appropriate requirements as cleanup standards, standards of control and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well-suited to the particular site.

Because CERCLA on-site response actions do not require permitting, only substantive requirements are considered as possible ARARs. Administrative requirements such as approval of, or consultation with administrative bodies, issuance of permits, documentation, reporting, record keeping, and enforcement are not ARARs for the CERCLA actions confined to the site.

Federal ARARs determined to be practicable for the Site are:

- U.S. Department of Transportation of Hazardous Materials Regulations 49 CFR Part 171, 172 and 173.
- The RCRA Land Disposal Restrictions (LDRs) 40 CFR 268.40 Subpart D implemented through Title 22 Section 66268.40.
- Uranium Mill Tailings Radiation Control Act (40 CFR Part 192.12 subparts B and C) requirements for residential cleanup levels of tailings sands.

- Native American Graves Protection and Repatriation Act, 25 USC Section 3001 *et seq.* and its implementing regulations, 43 CFR Part 10.
- National Historic Preservation Act, 16 USC 470 *et seq.*; 36 CFR Part 800
- Archaeological Resources Protection Act of 1979, 16 USC Sections 47000-47011; 43 CFR Part 7
- American Indian Religious Freedom Act, 42 USC Section 1996 *et seq.*
- Clean Water Act, Section 402, 33 USC 1342 (NPDES stormwater discharges)
- Clean Water Act, Section 404, 33 USC 1344 (Regulates discharge of dredge or fill material into waters of the U.S.)

Additional Federal guidance to be considered:

- U.S. EPA Directive on Protective Cleanup Levels for Radioactive Contamination at CERCLA sites. OSWER Directive 9200.4-18.

The Site, including the IRA Area, has been surveyed for potential impacts on archaeological, historic and cultural resources. The Navajo Historic Preservation Department approved the proposed removal action with a Cultural Resources Compliance Form dated June 9, 2009.

No State or Tribal ARARs have been identified.

4. Project schedule

The IRA is scheduled to start immediately after approval of the action as indicated by the signature on this memorandum and EPA approval of the Administrative Settlement Agreement and Order on Consent with PRPs UNC and GE. The removal activities are expected to take approximately five months to complete.

B. Estimated Costs

As stated above, U.S. EPA expects to enter into an Administrative Settlement Agreement and Order on Consent with UNC and GE to conduct IRA. U.S. EPA may incur the following costs in its role overseeing or reviewing the response actions to be completed. These are costs for oversight to come from the Regional Removal Allowance through the NECR Site Special Account.

Regional Removal Allowance Costs

START Contractor/USCG PST	<u>\$ 300,000</u>
Extramural Subtotal	\$ 300,000
TOTAL, Removal Action Project Ceiling	\$ 300,000

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Given the site conditions, the nature of the hazardous substances documented on site, and the potential exposure pathways to nearby populations described in Sections III and IV above, actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

VII. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues with the Site identified at this time.

VIII. ENFORCEMENT

Please see the attached Confidential Enforcement Addendum for a discussion regarding potentially responsible parties (PRPs). U.S. EPA expects the PRP to sign an Administrative Settlement Agreement and Order on Consent requiring the PRPs to pay for all work, and to reimburse U.S. EPA for the oversight costs. The following intramural costs are also recoverable:

Intramural Costs²

U.S. EPA Direct Costs	\$ 100,000
U.S. EPA Indirect Costs (35.28%)	\$ <u>141,120</u>
TOTAL Intramural Costs	\$ 241,120

The total USEPA extramural and intramural costs for this removal action, based on full-cost accounting practices that will be eligible for cost recovery are estimated to be \$541,120.

IX. U.S. EPA RECOMMENDATION

² Direct costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site-specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual costs from this estimate will affect the United States' right to cost recovery.

This decision document represents the selected removal action for the NECR Step-Out Area Site, Coyote Canyon Chapter, McKinley County, New Mexico developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site.

Because conditions at the site meet the NCP criteria for a Time-Critical Removal Action, USEPA enforcement staff recommends the approval of the removal action proposed in this Action Memorandum. The total project ceiling if approved will be \$300,000, of which an estimated \$300,000 comes from the NECR Special Account. Approval may be indicated by signing below.

Approve: Elizabeth J. Adams July 23, 2009
Elizabeth J. Adams, Assistant Director
Superfund Division
Partnerships, Land Revitalization & Cleanup Branch

Disapprove: _____
Elizabeth J. Adams, Assistant Director
Superfund Division
Partnerships, Land Revitalization & Cleanup Branch

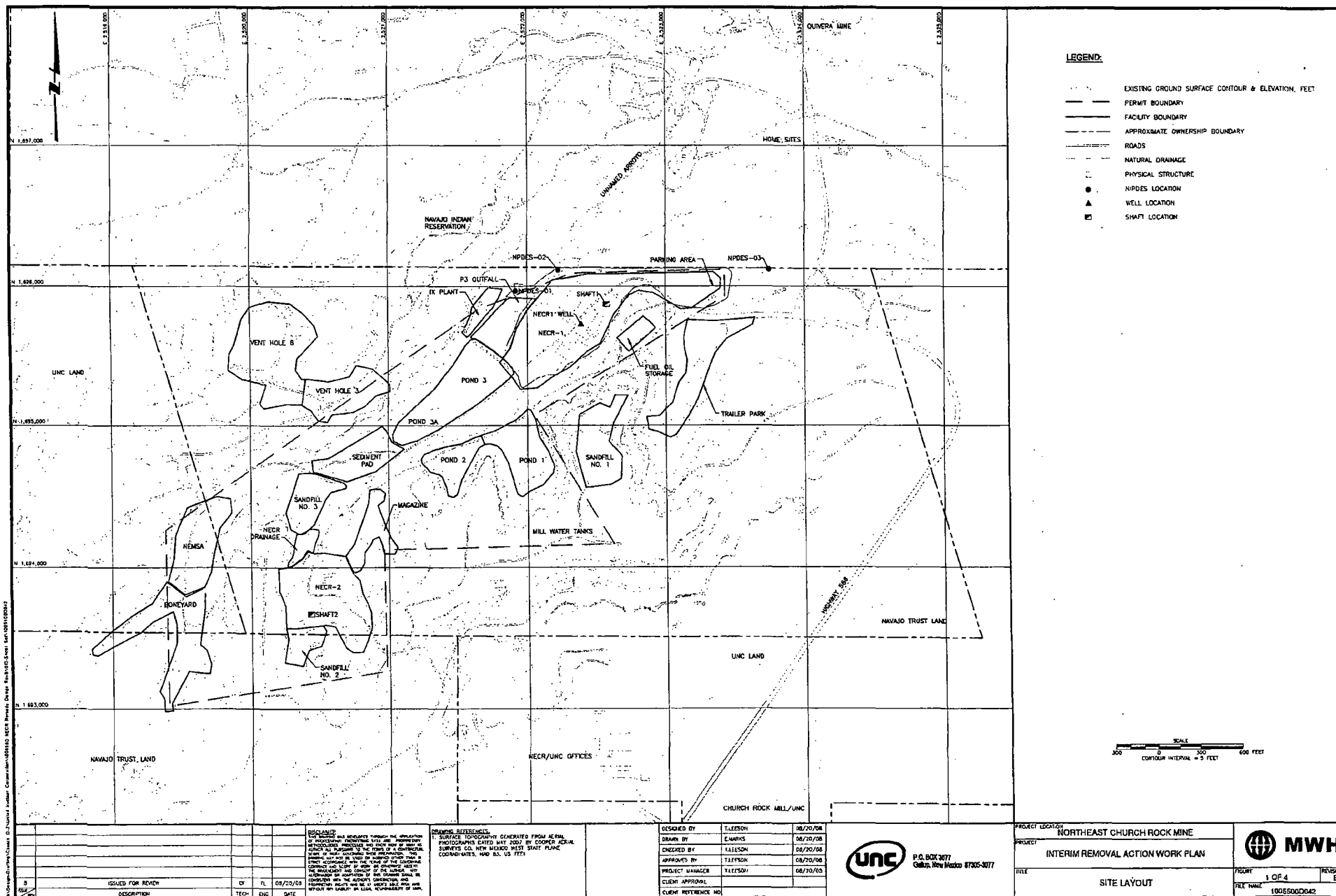
Confidential Enforcement Addendum

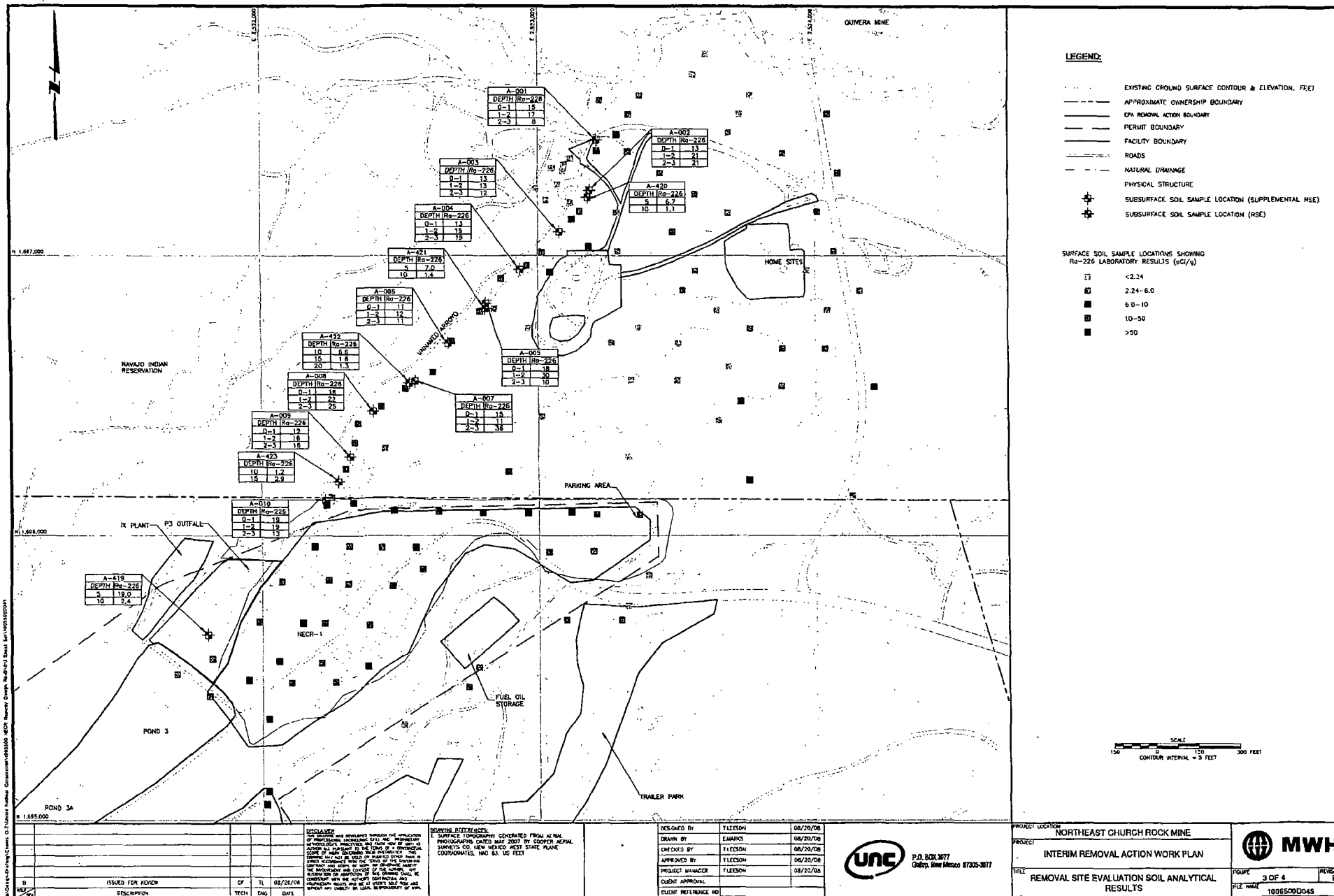
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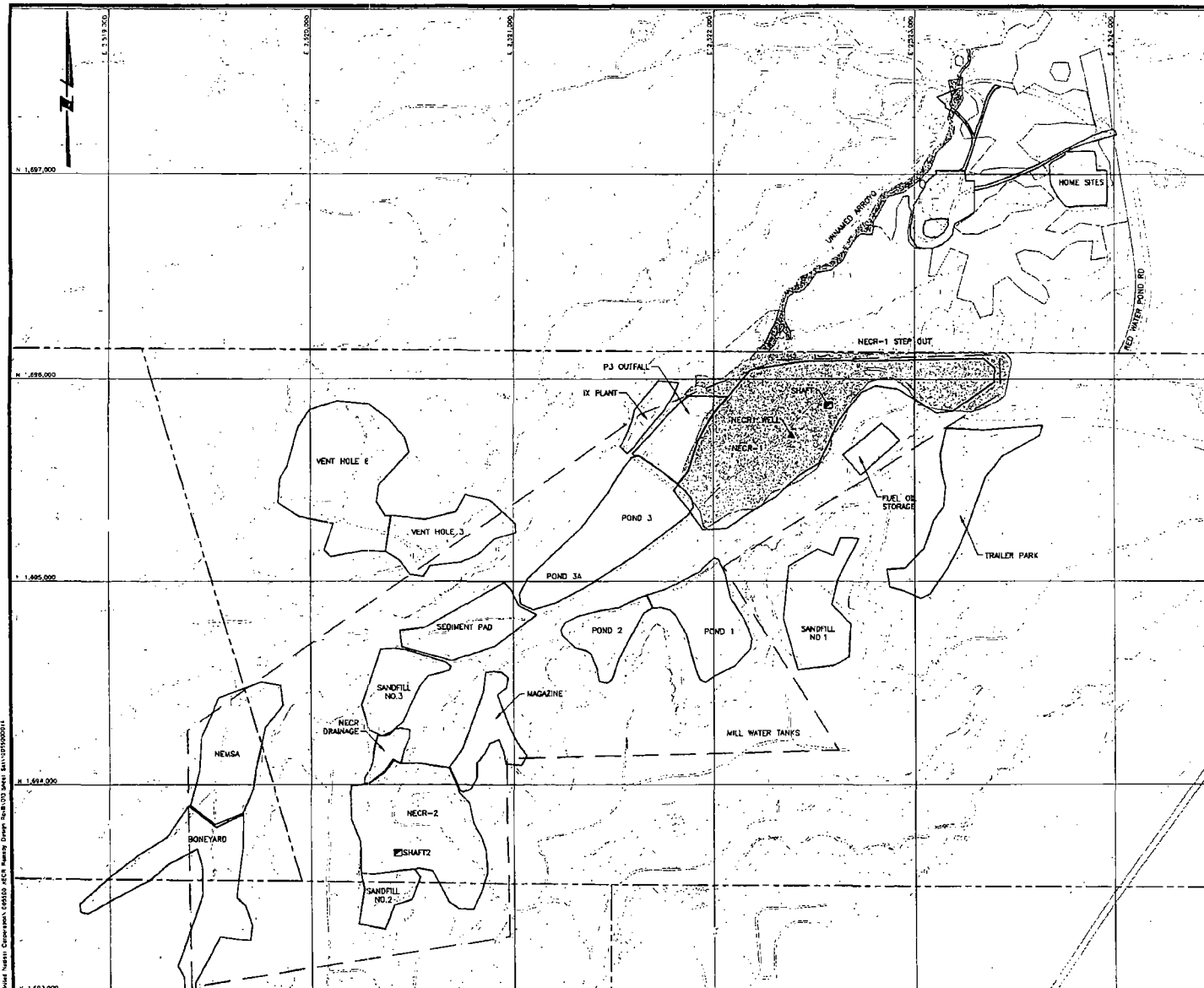
- I. Index to the Administrative Record
- II. Data sheets for NECR1 Step-Out Area and Unnamed Arroyo #1 sediments
- III. Photograph Log

cc: Sherry Fielding, USEPA, OERR, HQ
Steven Etsitty, Navajo Nation Environmental Protection Agency
David Taylor, Navajo Nation Department of Justice
Bill Brancard, New Mexico Mining and Minerals
Steven Spencer, U.S. Department of Interior
Don Williams, USEPA, Region 6

bcc: H. Allen, SFD-9-2
A. Bain, SFD-6-2
H. Karr, ORC-3
C. Temple, SFD-9-2
Mark Purcell, U.S. EPA Region 6
Stanley Edison, Navajo Nation Environmental Protection Agency
Freida White, Navajo Nation Environmental Protection Agency
Michele Dineyazhe, Navajo Nation Environmental Protection Agency
Site File







LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- PERMIT BOUNDARY
- FACILITY BOUNDARY
- APPROXIMATE OWNERSHIP BOUNDARY
- EPA REMOVAL ACTION BOUNDARY
- ROADS
- NATURAL DRAINAGE
- PHYSICAL STRUCTURE
- REGRADE & COVER
- SCRAPE 0.5-1'
- EXCAVATE >1'
- WELL LOCATION
- SHAFT LOCATION



<p>DISCLAIMER</p> <p>THIS DOCUMENT IS A PRELIMINARY DESIGN AND NOT A CONTRACT. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR VERIFYING THE ACCURACY OF THE DATA AND INFORMATION PROVIDED. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR VERIFYING THE ACCURACY OF THE DATA AND INFORMATION PROVIDED. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR VERIFYING THE ACCURACY OF THE DATA AND INFORMATION PROVIDED.</p>				<p>DRAWING REFERENCES</p> <p>1. SURFACE TOPOGRAPHY GENERATED FROM Aerial PHOTOGRAPHY DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83 US FEET.</p>				<p>DESIGNED BY: T. LEECHON 06/20/08</p> <p>DRAWN BY: E. MAROS 06/20/08</p> <p>CHECKED BY: T. LEECHON 06/20/08</p> <p>APPROVED BY: T. LEECHON 06/20/08</p> <p>PROJECT MANAGER: T. LEECHON 06/20/08</p> <p>CLIENT APPROVAL:</p> <p>CLIENT REFERENCE NO:</p>				<p>PROJECT LOCATION: NORTHEAST CHURCH ROCK MINE</p> <p>PROJECT: INTERIM REMOVAL ACTION WORK PLAN</p> <p>TITLE: INTERIM REMOVAL ACTION AREAS</p>				<p>SCALE: 1" = 100'</p> <p>CONTOUR INTERVAL: 5 FEET</p>			
<p>ISSUED FOR REVIEW</p> <p>CF TL 06/20/08</p> <p>TECH ENG DATE</p>				<p>REVISIONS</p> <p>1. 06/20/08</p>				<p>PROJECT MANAGER: T. LEECHON</p> <p>CLIENT APPROVAL:</p> <p>CLIENT REFERENCE NO:</p>				<p>PROJECT LOCATION: NORTHEAST CHURCH ROCK MINE</p> <p>PROJECT: INTERIM REMOVAL ACTION WORK PLAN</p> <p>TITLE: INTERIM REMOVAL ACTION AREAS</p>				<p>SCALE: 1" = 100'</p> <p>CONTOUR INTERVAL: 5 FEET</p>			



ATTACHMENT I
INDEX TO THE ADMINISTRATIVE RECORD

1. Final Removal Site Evaluation Work Plan, NECR. Prepared by MWH. August 30, 2006.
2. Technical Memorandum, Results of Background and Radium-226 Correlation Sampling, NECR Mine Site, United Nuclear Corporation. Prepared by: MWH. October 2006.
3. Final Removal Site Evaluation Report Northeast Church Rock Mine Site. Prepared by MWH. October 1, 2007.
4. Supplemental Removal Site Evaluation data tables. Prepared by MWH 2009.
5. Letter from Navajo Nation agreeing to Interim Removal Action Work Plan, July 15, 2009
6. Agency for Toxic Substances and Disease Registry (ATSDR) ToxFAQs, Radium CAS#7440-14-4. ATSDR. July 1999.
7. The Administrative Record for the Residential Removal Action is hereby incorporated by this reference.

ATTACHMENT II
REMOVAL SITE EVALUATION AND SUPPLEMENTAL REMOVAL SITE
EVALUATION DATASHEETS
NECR MINE

Attachment II

Removal Site Evaluation Data

ANAGRP	METALS
ZONE	(All)
UNITS	(All)

Max of RESULT2			CHEM CODE					
AREA	LOC ID2	LABSAMPID2	AS	MO	RA-226	SE	U	V
Arroyo	Arroyo-SB-001	C06120235-072		2.6	0	14.9	4.4	29 27.1
		C06120235-073		5.4	0	17.3	3.7	27.3 29.6
		C06120235-074		7.8	0	8.4	2.1	14.3 32.6
	Arroyo-SB-002	C06120336-001		2.2	0	12.7	5.9	15.6 24
		C06120336-002		2.8	0	21.1	8	21.7 28.1
		C06120336-003		6.1	0	21	11.1	108 34.2
	Arroyo-SB-003	C06120336-004		1.4	0	12.9	0	14.2 20
		C06120336-005		3.6	0	13.3	1.9	18.6 23.3
		C06120336-006		4.7	0	12.4	3	16.4 29.6
	Arroyo-SB-004	C06120336-007		1.2	0	12.5	1.1	14.6 19.8
		C06120336-008		2.9	0	14.9	5.3	16.6 23.8
		C06120336-009		6.3	0	18.5	2.8	23.7 34.9
	Arroyo-SB-005	C06120336-010		2.2	0	18.1	12.7	25.7 30.4
		C06120336-011		4.7	0	30.2	14.4	79.2 37.9
		C06120336-012		7.3	0	10.3	4.9	27 36.6
	Arroyo-SB-006	C06120336-013		1.7	0	11.2	2.9	18.7 20.7
		C06120336-014		3.3	0	11.8	3	23.7 24
		C06120336-015		8.2	0	11.1	2.1	19.4 36.1
	Arroyo-SB-007	C06120336-016		1.8	0	14.8	3.5	21.7 34.7
		C06120336-017		2.6	0	11.1	2.9	17.1 25.5
		C06120336-018		4.3	0	35.7	4.3	45.4 37.3
	Arroyo-SB-008	C06120336-019		1.9	0	17.6	4.6	17.4 27.9
		C06120336-020		2.1	0	21.5	6.3	17.1 28
		C06120336-021		2.1	0	24.5	7.4	21.3 30.9
	Arroyo-SB-009	C06120336-024		2.2	0	11.7	5.6	22.6 22.7
		C06120336-025		1.3	0	15.5	2.3	23.7 23.5
		C06120336-026		3.5	0	15.5	11.3	31.7 32.5
	Arroyo-SB-010	C06120336-027		2.6	0	18.5	12.4	35.1 34.1
		C06120336-028		1.9	0	18.6	5.5	26.6 25.1
		C06120336-029		1.5	0	12.9	6	21.9 23.1

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Arroyo	Arroyo-SB-208	C06120336-022	2.2	0	20.2	4.5	19.2	29.1
		C06120336-023	2.2	0	23	8.1	22.3	32.4
Backgrd	NECRBKG-01	C06081541-001	4.4	0	0.8	0.2	0.8	24.7
	NECRBKG-02	C06081541-002	9.2	0	1.3	0.7	1.4	29.8
	NECRBKG-03	C06081541-003	10	0	1.1	0.7	1.8	32.3
	NECRBKG-04	C06081541-004	5.1	0	1.3	0.7	1.3	40.7
	NECRBKG-05	C06081541-005	4.5	0	1.1	0.5	1	30.7
	NECRBKG-06	C06081541-006	6.1	0	1	0.6	1.1	31.9
	NECRBKG-07	C06081541-007	4.2	0	1.1	0.5	1.3	33.5
	NECRBKG-08	C06081541-008	3.1	0	1.2	0.4	1.4	32.5
	NECRBKG-09	C06081541-009	2.8	0	1.2	0.5	1.4	31.6
	NECRBKG-10	C06081541-010	2.5	0	0.9	0.5	1.1	27.3
	NECRBKG-11	C06081541-011	2.9	0	1	0.4	0.9	30.6
	NECRBKG-12	C06081541-012	3.1	0	1.2	0.3	1	23.7
	NECRBKG-13	C06081541-013	2.8	0	1	0.4	1.1	31.2
	NECRBKG-14	C06081541-014	2.4	0	1	0.2	1.1	20.1
	NECRBKG-15	C06081541-015	2.7	0	1.2	0.5	1.2	28.7
	NECRBKG-16	C06081541-016	2.7	0	0.7	0.4	1.2	23
	NECRBKG-17	C06081541-017	3	0	1.1	0	1.2	29
	NECRBKG-18	C06081541-018	2.4	0	0.6	0	1.1	21.2
	NECRBKG-19	C06081541-019	2.7	0	1.1	0.2	0.9	18.4
	NECRBKG-20	C06081541-020	2.7	0	1	0	0.9	20
	NECRBKG-21	C06081541-021	2.9	0	1	0.3	1	22.5
	NECRBKG-22	C06081541-022	3.4	0	0.8	0.2	0.9	18
	NECRBKG-23	C06081541-023	2.9	0	0.9	0	0.9	22.6
	NECRBKG-24	C06081541-024	2	0	1	0	0.9	18.8
	NECRBKG-25	C06081541-025	2.5	0	1.3	0	1.2	24.9
	NECRBKG-42	C06081541-026	3.3	0	1	0	0.9	17.5
	NECRBKG-45	C06081541-027	2.7	0	1.3	0.3	1	26.8
CORR	NECR-COR-A-01	C06081547-001			1.9			
	NECR-COR-A-02	C06081547-002			5.4			
	NECR-COR-A-03	C06081547-003			4.5			
	NECR-COR-A-04	C06081547-004			1.8			
	NECR-COR-A-05	C06081547-005			3.7			
	NECR-COR-A-06	C06081547-006			1.1			
	NECR-COR-A-07	C06081547-007			1.5			

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Removal Site Evaluation Data

CORR	NECR-COR-A-08	C06081547-008	3.5						
	NECR-COR-A-09	C06081547-009	6.6						
	NECR-COR-A-10	C06081547-010	31.6						
	NECR-COR-A-11	C06081547-012	1.9						
	NECR-COR-A-12	C06081547-013	6.8						
	NECR-COR-A-13	C06081547-014	8.9						
	NECR-COR-A-14	C06081547-015	10.3						
	NECR-COR-A-15	C06081547-016	9.2						
	NECR-COR-A-16	C06081547-018	6.2						
	NECR-COR-A-17	C06081547-019	185						
	NECR-COR-A-18	C06081547-020	40.4						
	NECRCOR-A-19	C06081541-028	1						
	NECR-COR-A-50	C06081547-011	32.3						
	NECR-COR-A-55	C06081547-017	8.8						
	NECR-COR-B-01	C06081542-001	11.9						
	NECR-COR-B-02	C06081542-002	10.6						
	NECR-COR-B-03	C06081542-003	9.7						
	NECR-COR-B-04	C06081542-004	11.4						
	NECR-COR-B-05	C06081542-005	15.8						
	NECR-COR-B-06	C06081542-006	15.7						
	NECR-COR-B-07	C06081542-007	14.9						
	NECR-COR-B-08	C06081542-008	14.4						
	NECR-COR-B-09	C06081542-009	18.9						
	NECR-COR-B-10	C06081542-010	21.2						
	NECR-COR-B-11	C06081542-012	19.6						
	NECR-COR-B-12	C06081542-013	21.4						
	NECR-COR-B-13	C06081542-014	19.2						
	NECR-COR-B-14	C06081542-015	21						
	NECR-COR-B-15	C06081542-016	26.4						
	NECR-COR-B-40	C06081542-011	22.1						
	NECR-COR-B-45	C06081542-017	27.6						
Homes	Home1-SS-001	C06110906-048	2.9	0	1.2	0	0.8	21.5	
	Home1-SS-002	C06110906-049	2.7	0	0.9	0.3	1	28.9	
	Home1-SS-003	C06110906-050	3.2	0	1	0.2	1	27.8	
	Home1-SS-004	C06110906-051	2.3	0	1.3	0	1	31.2	
	Home1-SS-005	C06110906-052	5.7	0	1.5	0	1.4	32.3	

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Removal Site Evaluation Data

Homes	Home2-SS-001	C06110906-053	5.9	0	0.9	0.7	1	35.9
	Home2-SS-002	C06110906-054	5.1	0	0.9	0.3	0.7	37.5
	Home2-SS-003	C06110906-055	4.1	0	0.9	0.6	1	36.1
	Home2-SS-004	C06110906-056	3.6	0	0.9	1.2	0.8	33.4
	Home2-SS-005	C06110906-058	4.5	0	0.9	0.3	1	35.5
	Home2-SS-204	C06110906-057	4.7	0	1	0.7	1	36.5
	Home3-SS-001	C06110906-059	3.3	0	0.9	0	1.4	32.8
	Home3-SS-002	C06110906-060	3.3	0	1.1	0	0.9	31.2
	Home3-SS-003	C06110906-061	3.7	0	1.1	0.6	0.7	28.5
	Home3-SS-004	C06110906-062	4.5	0	1.2	0.7	1	37.4
	Home3-SS-005	C06110906-063	6.4	0	1.1	0	1.1	42.6
	Home4-SS-001	C06110906-064	3.9	0	1.3	0	1.1	33.5
	Home4-SS-002	C06110906-065	3	0	2.1	0.8	1.5	26.6
	Home4-SS-003	C06110906-067	3.2	0	1.6	0.7	1.5	25.8
	Home4-SS-004	C06110906-068	6	0	3.6	1.6	3.5	28.8
	Home4-SS-005	C06110906-069	4.3	0	3	1.1	2.7	28.2
	Home4-SS-202	C06110906-066	3.1	0	2.1	0.4	1.4	26.5
	Home5-SS-001	C06110906-070	3	0	1	0.9	0.8	30.1
	Home5-SS-002	C06110906-071	5.2	0	1.4	1.2	1.1	31.9
	Home5-SS-003	C06110906-072	4.4	0	0.9	1	0.9	30
	Home5-SS-004	C06110906-073	7.2	0	1.3	0.8	1.4	31.2
	Home5-SS-005	C06110906-074	3.3	0	2.1	0.7	2.4	23.8
	Home6-SS-001	C06110906-075	4.2	0	6.1	1.5	9.3	33.9
	Home6-SS-002	C06110906-076	4.4	0	11.4	2	11.1	38.4
	Home6-SS-003	C06110906-077	4.5	0	5.6	2	5.7	34.8
	Home6-SS-004	C06110906-078	4.5	0	8.9	1.7	10.2	36.8
	Home6-SS-005	C06110906-079	4.2	0	14.9	2.7	12.7	37.3
	Home7-SS-001	C06110906-080	4.9	0	3.4	1.2	2.3	31
	Home7-SS-002	C06110906-081	4.4	0	5.5	1.5	6.3	34.1
	Home7-SS-003	C06110906-082	5.2	0	29.6	6.3	20.5	49.7
	Home7-SS-004	C06110906-083	5.5	0	9.4	2	11.8	43.3
	Home7-SS-005	C06110906-084	3.4	0	7.4	1.3	9.2	28.4
	Home8-SS-001	C06110906-085	3.5	0	2.3	0.2	2.1	30.9
	Home8-SS-002	C06110906-086	3	0	2.5	0.5	2.7	33.2
	Home8-SS-003	C06110906-087	2.7	0	3.2	0.5	5.3	34
	Home8-SS-004	C06110906-088	4.1	0	5.6	1.2	6.4	34

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Homes	Home8-SS-005	C06110906-089	5.3	0	3.3	0	4.9	38.8
	Home9-SS-001	C06110906-090	5	0	3.4	1	7.9	29.8
	Home9-SS-002	C06110906-091	3.6	0	3.3	0.7	8.1	27.8
	Home9-SS-003	C06110906-092	4.1	0	6.7	1.8	19.1	33.1
	Home9-SS-004	C06110906-093	2.8	0	5.4	1.2	12.4	26.1
	Home9-SS-005	C06110906-094	4.5	0	2.6	0.4	3.3	29.4
NECR-1	NECR1-SB-016	C06111057-012	0	0	80.8	59.5	758	62.4
		C06111057-014	3.8	0	21.1	9.5	99.5	34.2
		C06111057-015	0	0	64.6	29.6	141	54.4
		C06111057-016	0	0	63.1	32.8	144	35
		C06111057-017	5.1	0	1.4	0.6	21.4	38.7
	NECR1-SB-046	C06111057-003	0	0	58.8	54.2	176	52.5
		C06111057-044	0	0	31.9	24.6	71.1	41.7
		C06111057-045	0	0	19.3	5.4	72.7	31
		C06111057-046	6.9	0	1.3	1.4	337	41.5
		C06111057-047	5.2	0	1	0	3.4	34.4
		C06111057-048	5.5	0	1.1	0.5	0.8	39.2
		C06111057-049	6.2	0	1.1	0	1.1	37.9
	NECR1-SB-095	C06111057-018	3.8	0	27.7	6.7	90.4	41.9
		C06111057-019	7.9	0	7.9	1.1	11.4	48.4
		C06111057-020	5.2	0	1.8	0.9	2.4	39.7
		C06111057-078	3	0	75.7	30.6	209	45.1
	NECR1-SB-131	C06111057-084	1.6	0	41.5	14.7	58.7	34.3
		C06111057-117	2.8	0	67.4	15.4	58.6	47.8
		C06111057-118	7.3	0	1.9	0	59.4	40.7
		C06111057-119	5.1	0	1.8	0	19.2	31.5
		C06111057-120	7.9	0	1.2	0	1.6	39.8
		C06111057-121	5.2	0	1.3	0	1.5	37.3
	NECR1-SB-90	C06111057-021	4.4	0	6.9	1.9	8.5	41.2
		C06111057-022	3.1	0	4.2	0.8	43.2	44.5
		C06111057-023	0.8	0	103	20.6	125	89.5
		C06111057-024	0.9	0	90	45.4	144	63.7
		C06111057-025	0.6	0	48.9	47	218	83.3
		C06111057-026	6.4	0	1.7	0.2	313	31.7
		C06111057-027	4.9	0	1.3	0.4	331	34.5
		C06111057-028	4.3	0	1.2	1	240	35.1

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NECR-1	NECR1-SB-90	C06111057-029	5.3	0	1.3	0.8	165	42
		C06111057-093	2.3	0	84.8	29	122	47.1
	NECR1-SS-005	C06111057-013	3.7	0	8.9	2.6	5.1	28.6
	NECR1-SS-018	C06111057-011	2.1	0	21.7	5.4	17	27.1
	NECR1-SS-020	C06111057-010	1.9	0	46.2	54.1	52	38.3
	NECR1-SS-023	C06111057-009	4.5	0	18.3	11.2	71.2	42.8
	NECR1-SS-026	C06111057-008	0	0	68.4	69.4	199	42.5
	NECR1-SS-028	C06111057-007	7.4	63.8	26.3	6.6	79.9	35.4
		C06120336-054	5.7	55.5	18.5	5.5	42.4	21.4
	NECR1-SS-030	C06111057-006	5.3	0	6.5	2.1	8.5	32.5
	NECR1-SS-044	C06111057-004	1.3	0	47.9	27.3	57.7	48.4
	NECR1-SS-047	C06111057-002	2.3	0	31.3	19.2	27.7	33.8
	NECR1-SS-049	C06111057-001	8.3	214	29.3	5.1	664	22.9
	NECR1-SS-065	C06111057-097	5.7	0	28.4	16	59.1	56.9
	NECR1-SS-067	C06111057-096	2.9	0	38.3	21.2	55.1	39.1
	NECR1-SS-068	C06111057-095	1.9	0	12.8	5.7	256	21.6
	NECR1-SS-070	C06111057-094	2.5	0	26.1	9.4	49.6	32.8
	NECR1-SS-101	C06111057-090	4.4	0	12.7	4.1	27.2	30.2
	NECR1-SS-103	C06111057-089	5.6	0	17.7	7.9	17.7	41.6
	NECR1-SS-126	C06111057-087	5.9	10.8	50.9	14.1	99.3	48.6
	NECR1-SS-127	C06111057-086	6.9	15.2	93.3	21.6	177	75.9
	NECR1-SS-129	C06111057-085	4.4	0	7	2.4	7.7	31.9
	NECR1-SS-133	C06111057-083	2.1	0	54.7	12.6	52.6	35.8
	NECR1-SS-135	C06111057-082	4.6	0	63.2	16.5	81	61.3
	NECR1-SS-137	C06111057-081	5.4	0	52.6	17.6	98.5	64.2
	NECR1-SS-138	C06111057-080	2.2	0	48.6	13.5	19.9	26.8
	NECR1-SS-140	C06111057-079	4.8	0	15.8	4.2	21.2	34.7
	NECR1-SS-164	C06120235-037	4.3	0	35.7	11.4	22	43.2
	NECR1-SS-173	C06120235-038	4.5	0	4.6	1.4	5.6	32.3
	NECR1-SS-184	C06120235-039	2.7	0	1.2	1	2.9	35.9
	NECR1-SS-281	C06120235-047	4	0	80.5	53.1	83.4	69.7
	NECR1-SS-289	C06120235-048	5.7	0	1.8	1	3.1	30.6
	NECR1-SS-293	C06120235-049	9	0	7	3.2	21.4	32.9
	NECR1-SS-307	C06120235-050	13.3	0	3.8	1.1	6.8	41
	NECR1-SS-316	C06120235-009	2.7	0	1.3	0	1.2	19.3
	NECR1-SS-323	C06120235-007	3.7	0	2.6	0.9	2.2	32.3

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NECR-1	NECR1-SS-326	C06120235-008	2.8	0	5.2	1.6	4.3	28.5
	NECR1-SS-92	C06111057-092	3.1	0	13.2	8.2	18.1	28.3
	NECR1-SS-93	C06111057-091	2	0	35.7	12.8	56.9	29.6
	NECR1-TP-138	C06120405-010	6.9	0	24.2	13.2	73.6	42.3
	NECR-SS-207	C06120235-040	4.9	0	3.1	1.4	7.6	30.5
	NECR-SS-238	C06120235-041	7.9	0	1.6	1.4	3.4	42.9
	NECR-SS-240	C06120235-042	14.9	0	1.5	0.5	3.6	50.2
	NECR-SS-240 DUP	C06120235-043	13.9	0	1.2	1.1	3.8	48.7
	NECR-SS-262	C06120235-044	5.2	0	1.4	1.1	2.2	30.4
	NECR-SS-265	C06120235-045	4.9	0	1.6	0.4	2.4	30.6
	NECR-SS-266	C06120235-046	5.1	0	1.7	0.6	57.7	34.6
NECR-2	NECR2-SS-004	C06110906-046	4	0	1.2	0	1.5	28.9
	NECR2-SS-015	C06110906-032	3.5	0	97.2	11.9	107	46.7
	NECR2-SS-017	C06110906-033	2.8	0	55.3	13.3	48.9	39.9
	NECR2-SS-018	C06110906-034	3.4	0	3.6	1.2	2.2	29.4
	NECR2-SS-020	C06110906-042	1.3	0	38.1	15.7	66.2	26.8
	NECR2-SS-027	C06110906-047	3.4	0	35.3	6.6	12.3	34.9
	NECR2-SS-033	C06110906-035	3.3	0	2	1.2	5.2	16
	NECR2-SS-035	C06110906-037	1.9	0	160	26.7	370	67.3
	NECR2-SS-037	C06110906-036	4.8	0	4.6	1.2	7.1	33
	NECR2-SS-039	C06110906-038	2.3	0	35.4	6.5	29.5	26.7
	NECR2-SS-050	C06110906-040	6.4	0	1.2	0	2	24.7
	NECR2-SS-052	C06110906-045	2.5	0	23	5.6	43.5	31
	NECR2-SS-056	C06110906-041	3.4	0	11.9	2.6	3.9	33
	NECR2-SS-069	C06110906-043	4.7	0	8.9	2.6	9.6	34.2
	NECR2-SS-071	C06110906-044	5	0	40	14.5	45.7	58.9
	NECR2-SS-083	C06120235-017	3.3	0	3.1	0.4	3.2	26.5
	NECR2-SS-096	C06120235-018	8.1	0	1.4	0.4	3.7	39
	NECR2-SS-103	C06120235-019	4.9	0	1.5	0.6	2.1	35.6
	NECR2-SS-109	C06120235-020	6.4	0	1.6	0.9	1.7	37.2
	NECR2-TP-015	C06110906-021	3.6	0	2.5	1	17	35.4
	NECR2-TP-020	C06110906-018	3.2	0	1.2	0.9	9.7	25
	NECR2-TP-035	C06110906-015	2.9	0	10.4	1.4	35.5	18.8
	NECR2-TP-039	C06110906-019	3.6	0	5.5	2.1	32.2	33.7
	NECR2-TP-052	C06110906-016	3.4	0	12.6	4	70.6	32.5
		C06110906-017	3.2	0	2.9	0.8	32.7	25.9

Attachment II

Removal Site Evaluation Data

NECR-2	NECR2-TP-239	C06110906-020	3.3	0	5.2	1.4	15.8	34.1
NEMSA	NEMSA-TP-001	C06110906-027	3.6	0	1.2	0.6	1	28.6
		C06110906-028	0.8	0	45.8	17.5	71	32.5
		C06110906-029	1.5	0	57.3	15.6	67	35.1
		C06110906-030	4.9	0	1.3	0.4	311	28.5
	NEMSA-TP-002	C06120336-030	4.2	0	1.7	1	4.8	32.4
		C06120336-031	0.7	0	46.6	19	79.5	41.7
		C06120336-032	0	0	68.8	38.9	125	47.3
		C06120336-033	3.7	0	1.1	0	227	25.6
	NEMSA-TP-003	C06120336-034	3.2	0	0.9	1.7	0.9	18
		C06120336-035	0.6	0	38.2	24.2	17.6	36.4
		C06120336-036	4	0	0.8	0	49.3	24.9
	NEMSA-TP-004	C06120336-037	4.3	0	1.3	1.2	4.8	29.2
		C06120336-038	1.3	0	68.8	112	136	44
		C06120336-052	0.8	0	140	40.1	390	43.2
		C06120336-053	0	0	112	132	75.8	38.5
	NEMSA-TP-005	C06120336-039	4.3	0	2.6	0	2.2	28.9
		C06120336-040	4.5	0	8.4	0.5	27.3	32.8
		C06120336-041	3.4	0	0.8	0	1.4	26.5
Pond 1/2	Pond1/2-SB-71	C06111057-071	5.5	0	0.7	0	2.1	37.6
		C06111057-072	6.7	0	1	1	3.3	43.2
	Pond1/2-SB-82	C06111057-073	2.7	0	177	56.3	339	75.6
		C06111057-074	4.6	0	14.4	3.7	22.7	36.2
		C06111057-075	5	0	12.2	3.4	18.1	38
		C06111057-076	6.8	0	1.1	0	5	42.6
		C06111057-077	5.1	0	1.5	0	1.7	37.9
	Pond12-SB-071	C06111057-069	3.1	0	49.9	11.3	73.9	34.9
	Pond12-SB-71	C06111057-070	4.7	0	0.9	0	1.3	30.2
	Pond12-SS-009	C06120235-010	2.2	0	1.7	1.2	1.6	24.6
	Pond12-SS-011	C06111057-050	5	0	1.1	0	1	35.3
	Pond12-SS-012	C06120235-011	4.5	0	1.5	0.8	1.7	35.2
	Pond12-SS-014	C06111057-051	3.2	0	96.9	36.3	47.5	56.2
	Pond12-SS-019	C06111057-052	4.9	0	4.7	0.9	7.8	34.9
	Pond12-SS-020	C06111057-054	5	0	2.2	0.5	2	35.6
	Pond12-SS-023	C06111057-055	2.5	0	62.4	22.8	28.6	38.5
	Pond12-SS-024	C06111057-056	2.5	0	26.9	7.1	16.2	28.7

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Removal Site Evaluation Data

Pond 1/2	Pond12-SS-032	C06120235-012	4.4	0	1.6	0.8	2	33.5
	Pond12-SS-035	C06111057-057	8.8	0	78.5	30.6	85.5	83.7
	Pond12-SS-041	C06111057-059	4.2	0	3	1.5	4.1	26.8
	Pond12-SS-042	C06111057-060	5.6	0	1	0	1.5	35.5
	Pond12-SS-047	C06111057-061	3.7	0	73.1	24.3	37.7	49.6
	Pond12-SS-050	C06111057-062	5.3	0	13.7	5.3	11.9	35.8
	Pond12-SS-056	C06111057-063	5.3	0	11.2	3.2	10.1	35.9
	Pond12-SS-058	C06111057-064	5.5	0	655	159	1080	198
	Pond12-SS-061	C06111057-065	4.4	0	26.5	5.2	36.6	35.8
	Pond12-SS-063	C06120235-013	3	0	1.2	0.6	1.3	40.1
	Pond12-SS-069	C06111057-066	3.8	0	161	33	166	79.6
	Pond12-SS-076	C06111057-067	5.2	0	2.2	0.2	8	40.8
	Pond12-SS-077	C06111057-068	5.1	0	487	83.7	423	123
	Pond12-TP-030	C06120235-057	5.5	0	41.3	13.2	149	45.2
		C06120235-058	6.4	0	6.2	1.6	80.3	30.7
	Pond12-TP-035	C06120235-060	1.4	0	41.5	11.2	38.9	31.6
		C06120235-061	4.4	0	19.6	15.5	206	35.3
	Pond12-TP-035)	C06120235-059	3.2	0	417	159	286	158
	Pond12-TP-058	C06120235-062	4.3	0	438	227	760	173
		C06120235-063	5.6	0	1.3	2.6	59.4	31.9
Pond 3/3a	Pond3/3a-SB-61	C06111057-111	3.7	0	17.3	6.8	28.4	30.3
		C06111057-112	4.8	0	0.9	0	1.3	29.6
		C06111057-113	4.8	0	1.1	0	1	27.9
		C06111057-114	4.1	0	1.5	0	1	29.7
		C06111057-115	4.5	0	1	0	1.1	34.5
		C06111057-116	4.9	0	1.3	0	1	35
	Pond3-SS-001	C06111057-110	6.1	0	18.1	5.2	42	50.4
	Pond3-SS-007	C06111057-109	5.5	0	259	22.3	1020	64.1
	Pond3-SS-014	C06111057-122	5.7	6.6	875	71.9	3970	118
	Pond3-SS-015	C06111057-108	3.9	0	18.8	8.6	11.1	32.4
	Pond3-SS-027	C06111057-107	4	0	4.7	0.9	19.1	26.9
	Pond3-SS-038	C06111057-105	6.1	0	20.9	4.2	34.9	34.1
	Pond3-SS-042	C06111057-103	5.1	0	1.4	0.7	1.9	28.8
	Pond3-SS-046	C06111057-099	6.7	0	19.5	3.3	34.3	42.5
	Pond3-SS-057	C06111057-098	8.1	0	2.8	0.7	4.5	39.9
	Pond3-SS-059	C06111057-100	5.5	0	26.9	5.2	62.9	39.5

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Pond 3/3a	Pond3-SS-063	C06111057-102	6.4	0	3.8	2.9	8.8	38.9
	Pond3-SS-065	C06111057-101	5.7	0	39.6	5.2	68.4	46.8
	Pond3-SS-29	C06111057-106	5	0	312	24.5	1240	79.3
	Pond3-TP-007	C06120336-042	4.9	0	4.5	3.1	24.4	35.8
		C06120336-043	2.9	0	0.7	0	0.7	22.6
	Pond3-TP-014	C06120336-044	3.3	0	0.8	0	1.5	25.6
		C06120336-045	3.2	0	0.8	0	1.4	22.1
	Pond3-TP-029	C06120336-046	6.2	0	14.3	0.8	102	28.5
		C06120336-047	6.7	0	15.7	2.9	116	31.1
		C06120336-048	4.5	0	2.1	0	30.8	33.7
	Pond3-TP-037	C06120336-049	2.7	0	7.7	1	9.8	19.2
		C06120336-050	6.6	0	2.2	1	16.3	45.7
		C06120336-051	4.9	0	0.7	0	23.5	31.4
Sand 1	Sand1-SS-009	C06110737-028	5.1	0	1.8	0.3	1.9	20.2
	Sand1-SS-011	C06110737-024	3.2	0	5.8	0.9	2.5	22.8
	Sand1-SS-017	C06110737-022	2	0	2.1	0.3	2.8	11.8
	Sand1-SS-021	C06110737-026	2.6	0	2.3	0.7	12.6	13.4
	Sand1-SS-027	C06110737-027	2.8	0	4.4	0.6	1	14.1
	Sand1-SS-028	C06110737-029	3	0	0.8	0.2	0.7	15.6
	Sand1-SS-030	C06110737-023	4.1	0	14.3	2.5	10.6	33.9
	Sand1-SS-032	C06120235-014	4.6	0	3.8	1.3	2.5	34.4
	Sand1-SS-041	C06110737-025	5.6	0	1.3	0.4	2.1	23.2
	Sand1-SS-043	C06110737-030	3.4	0	6.7	1.7	1.8	18.8
	Sand1-SS-044	C06110737-015	6.7	0	11	1.6	1.7	31.9
	Sand1-SS-049	C06110737-016	4.9	0	16.8	3	41	81.3
	Sand1-SS-050	C06110737-018	5	0	15.7	8.1	4.5	26.1
	Sand1-SS-051	C06110737-019	4.6	0	1.9	0.5	1	32.6
	Sand1-SS-053	C06120235-015	7	0	5.4	1.4	2.5	32
	Sand1-SS-063	C06110737-020	3.3	0	20.8	3.5	6.9	28.5
	Sand1-SS-065	C06120235-016	4.6	0	4.3	1	3	30.1
	Sand1-SS-068	C06110737-021	2.3	0	47.3	19.2	41.3	42.1
	Sand1-SS-249	C06110737-017	5.1	0	19.1	3.7	44.8	82.5
	Sand1-TP-030	C06120405-011	2.9	0	113	15.8	31.7	45.7
		C06120405-020	13.9	0	4.8	1.4	5.2	44.8
	Sand1-TP-043	C06120405-012	3.4	0	0.6	0.4	0.8	17.4
	Sand1-TP-049	C06120405-013	3.4	0	75.8	17.3	32.3	40.6

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Sand 1	Sand1-TP-049	C06120405-014	4.4	0	6.4	2.4	3	23.9
	Sand1-TP-063	C06120405-016	1.1	0	80.6	21.7	89.8	48.5
		C06120405-017	9.2	0	8.8	4.6	60.5	28.3
	Sand1-TP-068	C06120405-018	2.5	0	57.4	34.3	91.6	45.3
		C06120405-019	6.5	0	7.1	0.6	27	10.4
Sand 2	Sand1-TP-249	C06120405-015	4.2	0	9	3.3	3.6	21.7
	Sand2-SS-003	C06110737-001	8	0	3.3	0.9	4.2	22.6
	Sand2-SS-004	C06110737-002	7.3	0	2	0.8	2.2	29.1
	Sand2-SS-006	C06110737-003	7.8	0	1.2	0.2	1	30.9
	Sand2-SS-007	C06110737-004	4	0	16.1	2.8	7	37.6
	Sand2-SS-010	C06110737-005	9	0	1.2	0.3	1.2	42.6
	Sand2-SS-011	C06110737-006	4.7	0	6.2	1	5.4	29.6
	Sand2-SS-012	C06110737-008	3.3	0	6.2	0.9	26.3	54.2
	Sand2-SS-014	C06110737-009	3.5	0	0.8	0	0.7	12.4
	Sand2-SS-015	C06110737-010	5.5	0	4.4	0.8	2.7	38.1
	Sand2-SS-016	C06110737-011	4.5	0	6.1	1.3	2.5	34.3
	Sand2-SS-017	C06110737-012	3.2	0	36	6.3	9	41.5
	Sand2-SS-019	C06110737-013	3.3	0	21.6	3.6	27.5	49.7
	Sand2-SS-020	C06110737-014	4.1	0	27.7	5	41.4	49
	Sand2-TP-008	C06110906-026	3.6	0	2.4	0.4	15.3	45
	Sand2-TP-011	C06110906-022	5.3	0	1.1	0.5	2.5	41.7
	Sand2-TP-012	C06110906-023	3.1	0	3.8	0	26.5	50.9
	Sand2-TP-017	C06110906-024	3.8	0	1.9	0.7	2.8	29.9
	Sand2-TP-019	C06110906-025	3.6	0	1.8	0	3.2	35.2
Sand 3	Sand3-SS-002	C06110906-013	3.4	0	15.3	4.2	42.6	43.7
	Sand3-SS-004	C06120235-064	2.1	0	1.4	1	3.5	34.9
	Sand3-SS-006	C06110906-012	4.7	0	17.4	3.5	119	39.6
	Sand3-SS-008	C06110906-014	3.7	0	1.4	0.5	2.9	34.1
	Sand3-SS-010	C06110906-010	3.8	0	33.4	7.2	136	45
	Sand3-SS-012	C06120235-065	4.3	0	1.4	0	2.3	38.8
	Sand3-SS-014	C06110906-005	1.7	0	123	33.5	396	51.5
	Sand3-SS-017	C06110906-011	5.3	0	1	0.7	1.4	26
	Sand3-SS-022	C06110906-004	2.9	0	1.2	0	0.9	22.7
	Sand3-SS-024	C06110906-003	4.3	0	27.4	5.8	7.4	33.2
	Sand3-SS-025	C06110906-002	2.7	0	26.9	5.5	10.9	28.6
	Sand3-SS-026	C06110906-001	2.5	0	19.6	5.3	7.3	20.6

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Sand 3	Sand3-SS-027	C06110906-007	4.7	0	4.5	1.4	3.2	28.7
	Sand3-SS-05	C06110906-009	1.5	0	66.9	32.2	86.4	54.5
	Sand3-SS-09	C06110906-008	3.7	0	31.9	14	41.4	41
	Sand3-SS-214	C06110906-006	1.7	0	123	47.6	516	63.5
	Sand3-TP-005	C06120235-066	0.8	0	40.8	39.2	131	63.3
		C06120235-067	4.3	0	28.1	3.6	78.8	33.9
	Sand3-TP-006	C06120235-068	5	0	8.4	0.8	102	35
	Sand3-TP-009	C06120235-069	6.9	0	5.1	1.7	90.6	38
	Sand3-TP-014	C06120235-070	4.2	0	1.2	1.3	227	29.4
		C06120235-075	1.5	0	84.1	29	488	52.2
Sed Pad	Sand3-TP-025	C06120235-071	4.6	0	27.2	8.9	21.1	41.3
	SEDPAD-SS-005	C06111057-030	3.1	0	17.7	3.7	14.1	25.5
	SEDPAD-SS-006	C06111057-031	3	0	38.8	14.2	21.7	39.5
	SEDPAD-SS-011	C06111057-033	11.6	0	3.8	2.7	27.3	502
	SEDPAD-SS-014	C06111057-036	2.7	0	236	78.8	366	106
	SEDPAD-SS-015	C06111057-037	1.5	0	33.4	12.9	34.7	31.5
	SEDPAD-SS-018	C06111057-038	7.1	0	1.5	1.3	1.9	46.8
	SEDPAD-SS-020	C06111057-039	6	0	12.8	3.8	17.7	22.2
	SEDPAD-SS-021	C06111057-040	1.3	0	85.6	45.4	1640	59.1
	SEDPAD-SS-022	C06111057-041	1.3	0	104	44.5	85.9	60.7
	SEDPAD-SS-025	C06111057-042	1.5	0	36.7	7.5	21.9	29.9
	SEDPAD-SS-026	C06111057-043	3	0	27.1	9	33.1	32.1
	SEDPAD-SS-07	C06111057-032	1.1	0	106	45.5	92.4	63.4
	SEDPAD-SS-08	C06111057-034	3	0	25.8	7.9	19.8	35.5
	SEDPAD-SS-12	C06111057-035	0.9	0	118	37.8	363	52.9
	SEDPAD-TP-006	C06120405-001	0.6	0	92.9	161	68.6	74.7
		C06120405-002	4.2	0	2.8	2.4	88.7	29
	SEDPAD-TP-012	C06120405-003	0.8	0	84	83.5	147	48.4
		C06120405-004	4.3	0	2.9	2.7	158	30.7
	SEDPAD-TP-014	C06120405-005	2.7	0	165	61.4	252	75
		C06120405-006	3.8	0	9.8	3.4	18.9	31.5
Trailer	SEDPAD-TP-021	C06120405-007	1.9	0	99.7	63.9	357	60.3
		C06120405-008	0	0	86.3	74.1	270	63.9
	SEDPAD-TP-026	C06120405-009	5.5	0	86.6	40.9	89	65.4
Trailer	Trailer-SS-001	C06120235-051	3.7	0	12.5	6.6	12.7	43.7
	Trailer-SS-009	C06120235-053	6.1	0	102	39.8	139	61.3

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Trailer	Trailer-SS-013	C06120235-052	0	0	33.2	101	44	78.4
	Trailer-SS-024	C06120235-054	5.4	0	2.1	1.7	16.7	32.8
	Trailer-SS-027	C06120235-056	5.3	0	2.1	0.8	1.7	31.7
	Trailer-SS-224	C06120235-055	5.5	0	1.8	1.1	16.5	33.1
Vent 3/8	Vent3-SS-034	C06120235-005	2.3	0	1.4	0.2	1.1	9
	Vent8-SS-002	C06120235-001	5.1	0	3.6	2.9	5.2	35.3
	Vent8-SS-006	C06120235-003	3.3	0	13.2	5	19.4	30.3
	Vent8-SS-019	C06120235-006	3.3	0	137	27.4	358	55.4
	Vent8-SS-031	C06120235-004	2.6	0	2.2	0.9	2.1	21.6
	Vent8-SS-202	C06120235-002	4.6	0	3.9	1.4	4.6	32.8
Boneyard	Boneyard-TP-001	C06110906-031	1.3	0	45.9	16.7	17.4	41.3
		C06120235-021	5.2	0	1.3	0.2	0.8	29.9
		C06120235-022	3.7	0	1.6	0.4	0.8	29
	Boneyard-TP-002	C06120235-023	5.5	0	2.2	0.6	2.1	32
		C06120235-024	5.2	0	1.1	0	1.5	31.1
		C06120235-025	4	0	1.1	0	0.9	27.8
	Boneyard-TP-003	C06120235-026	5.1	0	1.1	0.8	1.5	31.6
		C06120235-027	5.1	0	1.2	0	1	37.8
	Boneyard-TP-004	C06120235-029	1.9	0	50.7	33.4	228	33.9
		C06120235-030	3.3	0	10.1	3.1	240	22.2
		C06120235-031	3.5	0	1.9	0.8	5.5	24.7
	Boneyard-TP-004)	C06120235-028	0.8	0	48.4	24.3	12.5	36.9
	Boneyard-TP-005	C06120235-033	4	0	1.2	0	1	26
		C06120235-034	4	0	1.4	1.2	5.6	25.2
		C06120235-035	4	0	1.7	0.3	4.3	24.7
		C06120235-036	4.9	0	1.9	0.5	8.4	25.6
	Boneyard-TP-204	C06120235-032	4.2	0	13	4.6	475	24.5

Attachment II

Supplemental
RSE Data

Subsurface Soil Analytical Results Supplemental Removal Site Evaluation Sampling, April 2008 Northeast Church Rock Mine Site					
Location ID	Depth (ft bgs)	Ra-226 (pCi/g)	Uranium (mg/kg)	Gamma (cpm)	Comments
Unnamed Arroyo					
A-420	2	n/a		51,997	
	5	6.7	22.9	48,306	
	10	1.1	10.1	45,876	
	15	n/a		45,491	
	20	n/a		42,922	Possible bedrock
	25	n/a		45,957	Weathered bedrock
A-421	2	n/a		40,592	
	5	7.0	42.9	40,813	
	10	1.4	11.3	37,414	
A-422	2	n/a		63,052	
	5	n/a		63,185	
	10	6.6	14.6	58,560	
	15	1.6	7.69	56,082	
	20	1.3	7.11	53,924	
A-423	2	n/a		80,863	
	5	n/a		79,971	
	10	1.2	24.6	72,861	
	15	2.9	14.9	72,028	
	20	n/a		73,970	
	25	n/a		73,680	
	30	n/a		72,234	
	35	n/a		73,808	
	40	n/a		72,458	
	45	n/a		n/a	Bedrock
Boneyard					
BY-415	5	1.8	48.2	18,852	
	10	0.7	34.6	17,938	
	15	n/a		17,863	Possible bedrock
NECR-1					
N1-419	2	n/a		84,000	
	5	19	13.9	75,326	
	10	2.4	55.2	72,758	
	15	n/a		n/a	
NEMSA					
NA-416	5	n/a		50,573	
	10	n/a		37,417	
	15	17.5	117.0	44,685	
	20	1.9	17.6	31,452	
NA-417	2	3.1	21.6	23,570	
	5	2.5	11.1	23,531	

Attachment II

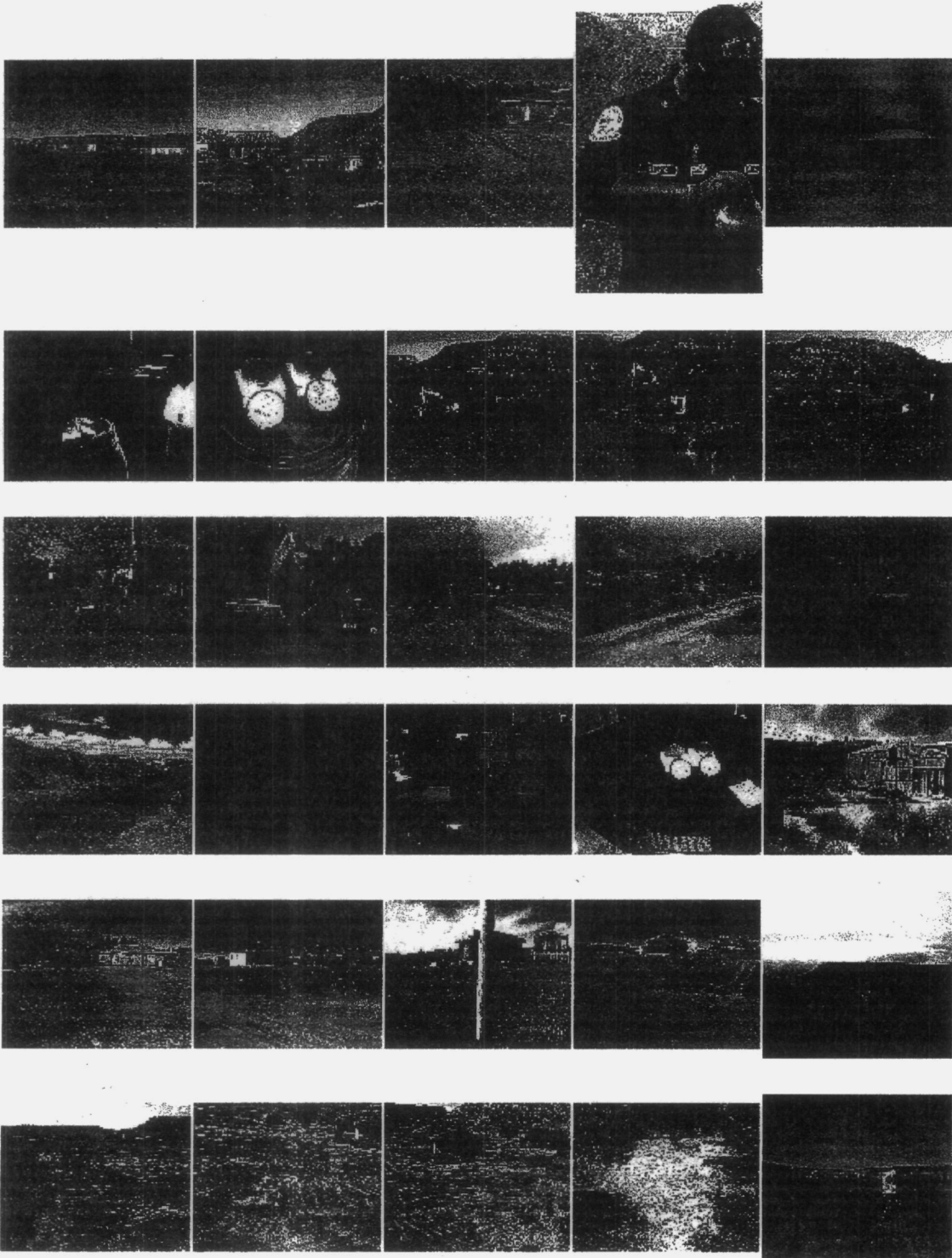
Supplemental
RSE Data

Subsurface Soil Analytical Results					
Supplemental Removal Site Evaluation Sampling, April 2008					
Northeast Church Rock Mine Site					
Location ID	Depth (ft bgs)	Ra-226 (pCi/g)	Uranium (mg/kg)	Gamma (cpm)	Comments
Pond 1					
P1-418	2	n/a		226,493	
	5	n/a		226,202	
	10	15.6	74.6	229,405	
	15.5	n/a		n/a	Bedrock
Pond 3					
P3-414	2	n/a		74,081	
	5	n/a		73,993	
	10	2.4	26.5	66,348	
	15	1.8	21.9	65,897	
	20	n/a		n/a	Weathered bedrock
Notes:					
n/a = not applicable					

**ATTACHMENT III
PHOTOGRAPH LOG
NECR RESIDENTIAL SITE**

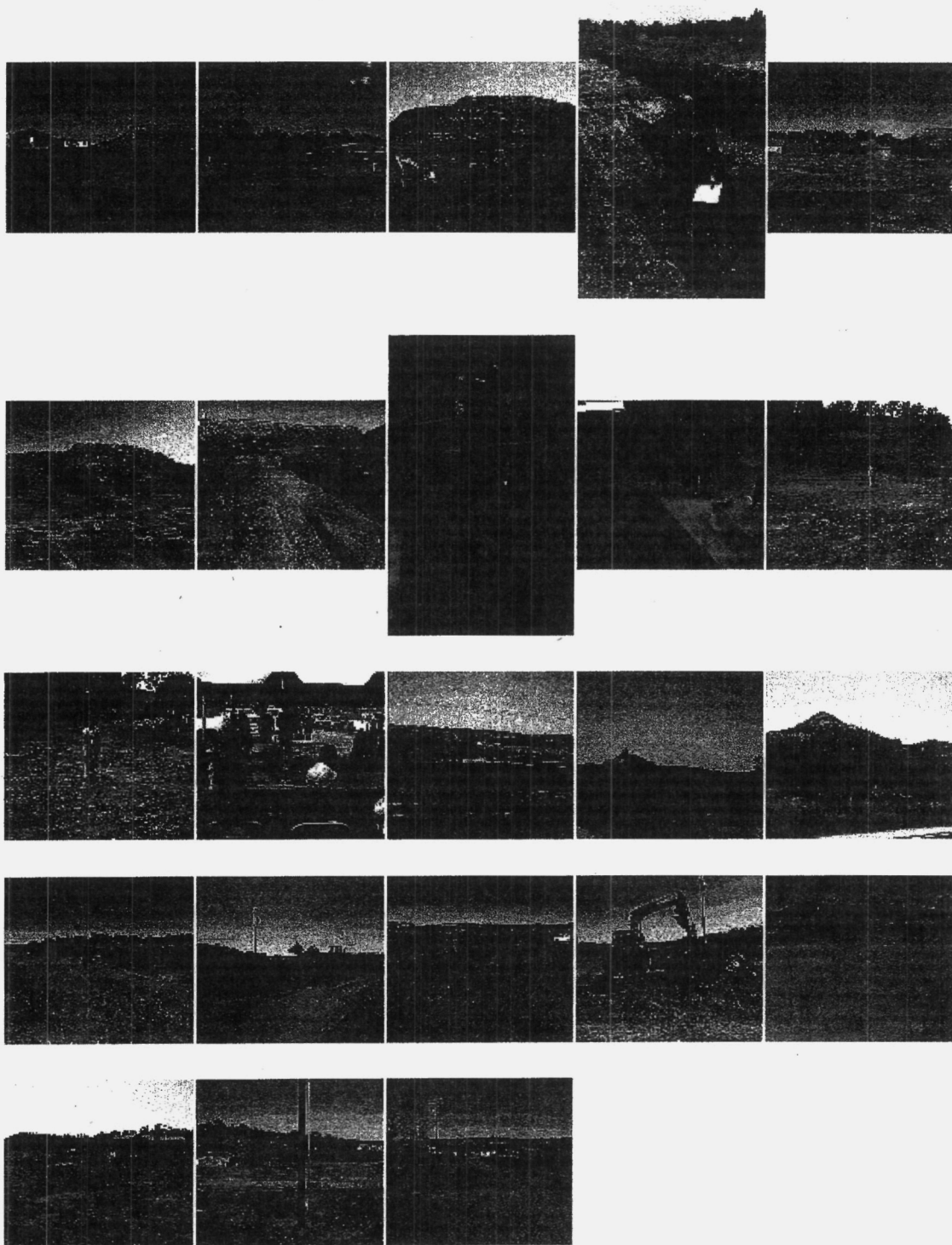
Attachment III

Photolog



Attachment III

Photolog



APPENDIX C
TO
ADMINISTRATIVE ORDER ON CONSENT
NORTHEAST CHURCH ROCK INTERIM REMOVAL ACTION
CERCLA DOCKET NO. 2009-11

Prepared for:

United Nuclear Corporation

P.O. Box 3077

Gallup, NM 87305

**INTERIM REMOVAL ACTION WORK PLAN
NORTHEAST CHURCH ROCK MINE SITE**

July 24, 2009

Prepared by:

MWH

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1.0 INTRODUCTION

This Interim Removal Action (IRA) Work Plan (The Work Plan) describes the objectives, scope of work and methods for conducting an IRA at and adjacent to the Northeast Church Rock (NECR) Mine (the mine site). This Work Plan has been prepared in conjunction with and is consistent with the Removal Site Evaluation (RSE) Work Plan (MWH, 2006) and will be performed in accordance with the provisions of the United States Environmental Protection Agency (EPA) Administrative Order on Consent (CERCLA Docket No. 2009-11) ("AOC") into which it has been incorporated by reference. All submittals required by this Work Plan will be subject to EPA review and approval as provided in the AOC. To the extent that there is a conflict between this Work Plan and the terms of the AOC, the AOC will control.

A layout of the Site is presented in Figure 1, *Site Layout*. The Site is located approximately 16 miles northeast of Gallup, McKinley County, New Mexico. This Work Plan has been prepared on behalf of United Nuclear Corporation (UNC) and uses applicable aspects of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM, EPA, 2000), as well as other applicable EPA guidance documents.

1.1 SITE BACKGROUND

The areas of concern for this IRA were investigated as part of the Removal Site Evaluation (RSE) and supplemental RSE investigations (SRSEs) conducted in 2006 through 2008. The results of the RSE are presented in the RSE Report (MWH, 2007) and the results of a supplemental surface soil RSE investigation are presented in the *Supplemental Removal Site Evaluation Report* (MWH, 2008). The results of these two investigations indicated that radium-226 (Ra-226) concentrations in soils exceed both the RSE Field Screening Level (FSL) of 2.24 pCi/g, as well as the UMTRCA Part 192 standard unrestricted use standards of 6.0 pCi/g (5.0 pCi/g + presumed 1.0 pCi/g background level) for shallow soils and 16 pCi/g for subsurface soils (15 cm or deeper) in areas of concern for the IRA. Additionally, a second supplemental RSE investigation was conducted in subsurface soils along the unnamed arroyo. The analytical results of these samples are shown on Figure 2, *Removal Site Evaluation Gamma Survey Results*, and Figure 3, *Removal Site Evaluation Soil Sampling Results*.

EPA Region 9 conducted a removal action in April through June 2007 of soils around three residences (designated for purposes of the RSE as Home Sites 4, 6, 7, 8, and 9) with exceedances of the FSL (E&E, 2007). The EPA removal action was initially limited to the 0.5-acre areas surrounding the home sites within which the RSE investigation was conducted; however the scope of the removal was expanded in the field. After the soils were removed, EPA conducted a final gamma survey and soil sampling of the excavated area, and then backfilled with clean soil and revegetated the areas (Ecology & Environment, 2007).

1.2 OBJECTIVES OF THE INTERIM REMOVAL ACTION

The objectives of the IRA will be to:

- Excavation: Remove soils containing Radium 226 (Ra-226) above 2.24 pCi/g (hereafter referred to as the IRA Action Level) from Navajo Reservation lands that are potentially attributable to historic activities at the NECR mine site.
- Regrading/Waste Deposition/Cover/Drainage: Reclaim the side-slopes of the NECR-1 pad to prevent transport of impacted materials via wind and storm water, place newly excavated soil and sediment on the waste pile, and regrading and covering with clean fill of the NECR-1 waste pile to reduce the chances of drainage of contaminants onto the side slopes and to convey surface drainage into the area designated as Pond 3.

- Erosion/Sediment Control: Install erosion and sedimentation controls on the periphery of the north portion of the NECR Mine site adjacent to the Navajo Reservation Boundary to prevent transport of potentially impacted material onto the reservation via stormwater (i.e., the unnamed arroyo and the drainage northeast of NECR-1). This will include installing sedimentation basins at the top of the unnamed arroyo on the mine site and within the drainage channel from the northeast portion of the site that drains towards the southern part of Red Water Pond Road. Regrading will be done to redirect runoff to the sediment basin. The sedimentation basins will be shown on a figure in the Construction Plan.
- Temporary Relocation and Services: provide temporary relocation and temporary relocation services for residents of the reservation lands in proximity to the Work.
- Investigation: investigate the Red Water Pond Road and the vicinity surrounding it to determine which portions of this area are in need of remediation.
- Revegetation: backfill with clean fill, as necessary and revegetate areas impacted by the Interim Remedial Action.
- Health & Safety: Implement the Work in a safe manner that is protective of site personnel as well as residents. UNC will offer temporary lodging to three households located in the immediate work area during implementation of the IRA.

The IRA excavation will be limited to those areas with exceedances of the IRA Action Level (see Figures 2 and 3) within the Navajo Reservation boundary, as shown on Figure 4 (*Interim Removal Action Areas*). As noted above, UNC is performing this IRA pursuant to the EPA Administrative Order on Consent into which it has been incorporated in order to advance removal activities on the reservation land adjacent to NECR. Additional response activities at the Site are anticipated in connection with an Engineering Evaluation/Cost Analysis (EE/CA) currently under development by EPA.

On May 15, 2009, Rena Martin, an Archaeologist with Dinetahdoo Cultural Resources Management performed a cultural resources inventory of the IRA work area. The survey identified one archaeological site (NM-Q-20-48), one traditional cultural property (TCP), seven isolated occurrences and two in-use sites and recommended clearance for the proposed work. On May 27, 2009 the Navajo Nation Historic Preservation Office issued a compliance form requiring that as a condition of compliance, "All Construction within 50 ft of the TCP must be flagged and monitored by a qualified archeologist prior to any activity." The TCP is not located within 50 feet of the proposed removal areas. If the pre-excavation radiation scanning discussed in Section 3.1.2 indicates that soils are impacted above the proposed action level within 50 feet of the TCP, UNC will retain a qualified archaeologist to flag and monitor the activities in this area.

2.0 SCOPE OF WORK

2.1 NECR-1 STEP-OUT AND VICINITY

The areas shown on Figure 4 north and northeast of NECR-1 on reservation land with surface soils containing Ra-226 in excess of the IRA Action Level will be excavated. Based on the RSE and SRSE work, the IRA Action Level is expected to be reached between 6 and 12 inches below ground surface (bgs). Ra-226 concentrations will be determined in the field using direct gamma radiation surveys correlated to Ra-226 concentrations based on site-specific conditions, consistent with the prior EPA removal action and as discussed in Section 3.0.

Excavation of surface soils within the step-out areas north and northeast of NECR-1 (see Figure 4) will be conducted westward until either the IRA Action Level or the edge of the unnamed arroyo are reached. To the east, excavation will be conducted to within 50 feet west of Red Water Pond Road. No removal action of the soils beneath or adjacent to Red Water Pond Road will be conducted. Respondents UNC and GE allege that impacts along the road appear to be associated with use of Red Water Pond Road as a haul road for other, unrelated mine sites. As discussed with EPA on July 11, 2009, additional soil sampling will be conducted along Red Water Pond Road to assess the extent of Ra-226 above the proposed action level. UNC and EPA will discuss potential approaches for conducting a removal action from Red Water Pond Road after the sampling results are received. To the south, excavation will extend up to the edge of the NECR-1 pile and the Navajo Reservation boundary in the southeast corner of the NECR-1 step-out area (see Figure 4). To the north, excavation will occur until the IRA Action Level is reached or until the arroyo that trends east-west is reached, as shown on Figure 4. The soils will be excavated and loaded into trucks, transported to NECR mine site, stockpiled, covered, and vegetated. The areas around the home sites where EPA previously conducted removal actions (see Figure 4) will not be included in the IRA, as soils above the FSL have already been removed from those areas.

The excavated areas will be regraded and backfilled, as necessary, to return the ground surface to approximately the original topographic configuration. All IRA areas will then be revegetated, as described in Section 2.4. Erosion and sedimentation controls to address potential transport of impacted soils onto the reservation, and to maintain stability of the excavated areas, will be in place during and after construction (see Section 2.5).

2.2 NECR-1 PILE

The IRA of the NECR-1 pile will consist of regrading the side slopes, regrading the top surface, covering with clean topsoil and revegetating. The side-slopes of NECR-1 (i.e., the northern and western slopes of the pile) will be regraded to no steeper than 2.5:1 (horizontal: vertical) for erosional and slope stability considerations. The top surface of the pile will be minimally graded to slope downward away from the side slopes and convey surface drainage into Pond 3 (see Figure 4).

The entire top surface of NECR-1 will be covered with six inches of clean topsoil and the regraded side slopes will be covered with one foot of clean topsoil. Once the topsoil has been placed on NECR-1, the entire area will be revegetated, as described in Section 2.4. Additional erosion and sedimentation controls to address potential transport of impacted soils onto the reservation will be utilized during and after construction (see Section 2.5).

The topsoil that will be used for backfill will come from thirty-five thousand cubic yards of topsoil previously obtained from the Pinedale chapter house property and stockpiled on UNC property. Prior to acquiring this material, UNC collected three soil samples from the stockpiled materials for analysis of Ra-226. The analytical results indicated Ra-226 from 0.6 to 0.7 pCi/g, within the range of concentrations detected in soil samples collected from the background reference area (MWH, 2006).

Appendix B provides calculations of the estimated soil loss from the NECR-1 pile and sideslopes due to erosion. Soil loss was estimated using the Revised Universal Soil Loss Equation 2 (RUSLE2) version 1.26.6.4. (Foster and Yoder, 2006) RUSLE2 software is the primary tool used in erosion modeling by federal agencies (e.g., Office of Surface Mines and U.S. Forest Service) to assess soil loss for mine reclamation applications. Based on RUSLE modeling, six inches of cover material on the top surface and 12 inches of material on the slopes will be sufficient to prevent exposure of underlying material due to sheet erosion.

2.3 UNNAMED ARROYO

Soils and sediment above the IRA Action Level are present in the unnamed arroyo, as discussed in the RSE report (MWH, 2006) and as confirmed in the supplemental subsurface soil investigation conducted in 2008 (see Figure 3). The RSE and SRSE results indicate that soils in excess of the IRA Action Level are present to approximately 6 feet bgs at the downstream end of the arroyo to approximately 16 feet bgs near NECR-1 (bgs referring to the bottom of the existing arroyo channel). Observations of the lithologies during drilling indicate that bedrock is present from approximately 25 feet bgs at the downstream end to approximately 45 feet bgs near NECR-1.

The IRA of the unnamed arroyo will consist of excavating soils within the confines of the unnamed arroyo until the IRA Action Level is reached (approximately 6 to 16 feet bgs). The excavation will extend laterally out to the edges of the existing arroyo banks. Upstream-downstream, excavation will extend from the reservation boundary (near NECR-1) to where the unnamed arroyo meets the next downstream arroyo (beyond the home sites). The excavated soils will then be hauled out of the arroyo and stockpiled at the NECR mine site and stabilized, covered and vegetated.

Following excavation of soil from the arroyo, clean soil will be placed in low reaches of the arroyo channel, and other reaches will be smoothed as needed to re-establish approximate pre-existing grade. Reclamation activities will avoid the existing banks of the arroyo to the extent feasible; however, it may be necessary in some areas to cut the banks back from the excavation to enhance stability of the slopes. Any slumping or caving of the side slopes that inadvertently occurs during excavation will be repaired to restore the topography so it remains similar to current conditions. Erosion and sedimentation controls to prevent transport of impacted soils into the arroyo will be in place during and after construction (see Section 2.5).

2.4 REVEGETATION

Areas impacted by the IRA activities will be revegetated. Revegetation is intended to reduce impacts to surface water by establishing a self-sustaining plant community that provides erosional stability. Inorganic fertilizer may be added to increase the nitrogen, phosphate, and potassium available to reseeded areas. Mulch will be applied after seeding is complete to conserve soil moisture and protect the soil from wind and water erosion. Revegetation will take place between June and September, if possible. Regraded areas will be seeded with a mixture containing native grasses and forbs that will not depend on external inputs of water or fertilizer. Specific species, composition percentages and seeding rates will be determined by a vegetation and wildlife survey and also will be selected to provide erosional stability.

To the extent practical, trees will be left in place and not disturbed during the IRA. MWH will conduct a vegetation survey to inventory the species and size and distribution of any native woody plants, including but not limited to trees. MWH will maintain an inventory of trees that are removed. This information will be used to develop a vegetation restoration plan that will be implemented as part of the final action.

2.5 REGULATORY COMPLIANCE

The construction activities work will be conducted consistent with CERCLA, requirements of Section 404 of the Clean Water Act (CWA) the requirements of the National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities (MSGP)(73 Federal Register 56572, 2008), the National Historic Preservation Act, and other ARARs identified by EPA. As provided by section 121(e) of CERCLA, permits will not be required for activities conducted entirely on-site. UNC/GE believe that all activities under the Work Plan are "on-site" as that term is defined in CERCLA, its implementing regulations, and USEPA guidance. As part of the MSGP requirements, UNC maintains a Stormwater Pollution Prevention Plan (SWPPP, MWH, 2005), which will be updated to incorporate the 2008 MSGP. Erosion control measures will be implemented, inspected, and maintained during construction and until the final removal action is implemented. Dust will be controlled during construction by watering haul roads and other dust-generating areas as necessary.

2.6 SITE ACCESS CONTROL

Primary access to the NECR mine site is from the end of Highway 566 and onto a dirt road that crosses the mine site. This dirt road crosses the area of NECR-1 that will be regraded and covered. This access road will be reconstructed at close to its current configuration to maintain access to the mine site. The current locked gate and fence will be maintained. The section of the fence that crosses the southeastern end of NECR-1 will be removed to facilitate the Work and then repaired and maintained after the IRA. Fences that are currently on-site will remain in place and/or will be repaired, as required. Temporary fencing will be installed at the end of each day to secure work areas where existing fencing is removed. UNC plans to retain security personnel for after-hours security.

3.0 RADIOLOGICAL SURVEYS

Radiological surveys conducted in a manner consistent with MARSSIM will be conducted for soil removal during the IRA. The radiological surveys will consist of excavation control surveys during construction, followed by a post-IRA status survey. The post-IRA status survey will be performed to confirm that the IRA met its objectives.

3.1 EXCAVATION CONTROL SURVEY

Excavation control surveys will be conducted to 1) support impacted soil excavation and removal; 2) determine when an area or a survey unit is ready for the post-IRA status survey; and 3) provide initial radiological data for planning the post-IRA status survey. The objective of the excavation control survey is to detect the presence of residual Ra-226 in soil at or below the IRA Action Level. This survey serves to monitor the effectiveness of soil excavation efforts that are intended to reduce residual Ra-226 in soil to the IRA Action Level. The excavation control survey is designed for expediency and cost effectiveness, as it needs to guide the IRA in real-time. In order to provide real-time excavation guidance, the excavation control survey will consist of in-situ direct gamma radiation level measurement in the field, as described in Section 5.4 of the MARSSIM for remedial action support surveys. The direct gamma radiation level survey for Ra-226 is a surrogate for gamma measurement of its decay product Bi-214. The EPA method 901.1 for laboratory analysis Ra-226 in soil also employs the Bi-214 surrogate gamma radiation measurement.

"In-situ" measurements consist of one-minute static measurements of gross gamma radiation level of the Ra-226 decay product Bi-214 using a 2x2" NaI detector. A site-specific calibration and correlation of the NaI detector between the gamma radiation levels, which includes gamma radiations from Bi-214 and Ra-226 content in soil, enables in-situ measurement of Ra-226 in the field. With adequate correlation, the in-situ measurement is a useful technique that provides real time measurement of Ra-226 in soil for cleanup and verification. Laboratory measurements consist of analysis of soil samples by a vendor laboratory for Ra-226 using gamma spectroscopy method 901.1. The laboratory gamma spectroscopy measurements are conducted under controlled conditions for distribution and decay product ingrowths which provide better accuracy. The laboratory results will be used for correlation soil sample analysis and confirmational soil sampling as discussed below.

A NaI gamma scintillation detector, similar to the one used for the RSE, will be used for direct gamma radiation level measurement during the excavation control surveys. The detector will be lead collimated for direct gamma radiation survey in order to minimize radiation shine interference from nearby radionuclide impacted areas (e.g., near the NECR-1 slope), and to focus on the localized area of interest under the detector. The direct radiation level will be measured by performing a scan gamma radiation survey and static gamma radiation measurements during the excavation control survey. The excavation control survey will be used as an interim step to guide soil removal. Areas that are determined to be clean on the basis of the excavation control survey will be surveyed in detail during the post-IRA status survey.

The direct gamma radiation level (in detector count rate) below which there is an acceptable level of assurance that the established IRA Action Level has been attained is equivalent to the level determined during the RSE, and will be used for immediate and in-field decisions. The gamma radiation level of 5,214 counts per minute (cpm) for the collimated detector equivalent to 2.24 pCi/g Ra-226 is based on the most recent site-specific correlation that was conducted for the supplemental RSE investigation in November 2007. This correlation was based on samples collected in the step-out areas north of NECR-1, and so is directly applicable to the IRA. The value of 5,214 cpm is consistent with the 5,272 cpm equivalent to 2.24 pCi/g Ra-226 determined for the unnamed arroyo

sediments in August 2006. In order to consider the statistical uncertainty associated with radioactive decay, the direct gamma radiation level equivalent to the cleanup level will be reduced by 1.96σ (standard deviation) to provide assurance at a 95% confidence level that the measured direct gamma radiation level count is below the cleanup level count. Therefore, the direct gamma radiation cleanup level of 5,070 cpm for the collimated detector will be used initially in the field for the excavation control. It is expected that a direct gamma radiation survey will be performed using a collimated detector in most of the areas. If a bare 2x2 NaI detector is used during the survey, a 16,360 cpm level (the 16,619 cpm equivalent to 2.24 pCi/g reduced by 1.96σ) determined during the August 2006 RSE activities will be used initially.

The interim removal activities will result in changes to the concentration and distribution of Ra-226 in soil, which could change the site-specific correlation between direct gamma radiation levels and Ra-226 concentrations in soil. For most areas, the correlation will be updated as necessary as per Standard Operating Procedure #2 (SOP-2) during the construction activities and revised for the post-IRA status survey. A description of the IRA-specific correlation survey is included in Section 3.1.3.

3.1.1 Excavation Control Survey Instrumentation

As previously discussed, the Ra-226 concentration in soil will be estimated by direct gamma radiation level measurements. Ra-226 is primarily an alpha emitting radionuclide with a gamma radiation emission of 186 KeV at about 4% intensity. Direct measurement of alpha radiation is not feasible. The low energy and intensity of the Ra-226 gamma radiation emission makes it impractical to determine Ra-226 in the field by direct gamma radiation measurement. However Bi-214, a Ra-226 decay product, emits high energy gamma radiations at a total of approximately 80% intensity. The gamma radiations of Bi-214 can be easily and accurately measured in the field utilizing a NaI scintillation detector, such as a 2x2 NaI Scintillation detector having high gamma radiation sensitivity. The Ra-226 concentrations in soil could be measured as a surrogate for gamma measurement of Bi-214 gamma radiation level. Bi-214 is a decay product of Ra-226 through radon-222 (Rn-222), a gaseous form, some of which emanates from soil. This phenomenon results in activity disequilibrium between Ra-226 and Bi-214 in the soil. The Rn-222 gas emanation fraction from the soil varies with different geometric characteristics of a particular soil. Therefore, a site-specific calibration is necessary. Previous studies have shown that about 20% of the Rn-222 gas decayed from Ra-226 in soil emanates out of the surface soil, indicating that a significant (about 80%) portion of this would decay into Bi-214 in the soil matrix. If the soil geometry and other parameters, such as moisture, radon emanation fraction, constituent distribution profile, gamma ray shine from nearby sources, and land topography are consistent, the ratio of Bi-214 to Ra-226 would also be consistent. This means there would be a direct correlation between Bi-214 gamma radiation levels and Ra-226 concentrations in the soil.

Any gamma radiation detector, whether for in-situ or laboratory measurement, responds to all of the gamma radiations that interact with the detector. Registering and counting only output pulses from interaction of a specific energy radiation with a detector would depend on the counting system. At low Ra-226 concentrations in soil (2.24 pCi/gm cleanup level), the detector output pulse from the decay product Bi-214 gamma radiations recorded by a scaler/ratemeter are estimated at about 25-30% of the output pulse generated by all gamma radiations (including background radiations) that interact with the detector when a gross gamma count (with a single baseline discriminator) is performed. This procedure was proposed in the Standard Operating Procedure provided as Appendix A. A calibrated portable single channel analyzer (SCA) (differential discriminator) with a NaI detector with adequate resolution, would register and count detector output pulses from specific energies (such as 609 ke V from Bi-214) causing the recorded counts from the B-214 to dominate and increase the Ra-226 measurement accuracy. An SCA produces a logic output pulse only if the output pulse amplitude lies between the two levels or a "window."

Similar to the instrumentation used for the RSE characterization, the instrument that will be used for direct gamma radiation level measurement during this survey will consist of a 2x2 NaI scintillation

detector (e.g., Eberline SPA-3) for detection of gamma radiation, connected to a ratemeter/scaler (such as Ludlum 2221) for processing and counting the detected gamma radiation. This instrument configuration has been used widely for this type of application, and is recommended by the MARSSIM. An SPA-3 scintillation detector is rugged with the highest sensitivity gamma radiation detection for field application and this type of field survey. The instrumentation will be calibrated as per SOP-1 included in the RSE Work Plan. The objective of the excavation control survey during the removal action will be to detect the presence of residual Ra-226 in soil at or below 2.24 pCi/g. This instrument configuration is designed to meet that objective. Daily function checks of the instruments will be performed in accordance with SOP-3 to assure proper operation.

The Minimum Detection Concentration (MDC) for both the static and scan gamma radiation survey will be calculated as discussed in SOP-1. Based on data collected during the RSE surveys, the instrument MDC is expected to be below or near 50% of the DCGL_W (1.24 pCi/g) and DCGL_{LMC} (2.0 pCi/g) for the survey. MDCs of about 0.6 pCi/g for a one-minute static survey and about 1.1 pCi/g for a scan survey were calculated for this instrument configuration.

3.1.2 Excavation Control Survey Protocol

Areas exceeding the IRA Action Level will be field located and marked with pin flags using the RSE and SRSE data and a differential global positioning system (DGPS). Additional radiation scanning will be used as appropriate to field delineate the impacted area boundaries. The areas may be divided into smaller subareas (e.g., 25 by 25 meter squares or 10-foot strips) to more efficiently control excavation, depending on the equipment used for excavation. The excavation fleet will remove the impacted soil in lifts based on the vertical extent of impacts in that area. The excavation control survey procedure is described in detail in SOP-3 of Appendix A. A scan radiation survey in combination with static measurements will be performed as specified in the SOP-3 to guide excavation in lifts until soil exceeding the cleanup level has been removed.

Following a soil excavation lift, a radiation scan will be performed with the detector at approximately 12 inches from the ground surface in a serpentine pattern along a transect or within the subdivided area at a rate of about one to two feet per second with the audio speaker set to 'on' to identify any locations that exceed the site cleanup level count rate by audio response and digital count rate display. The scan radiation survey will be conducted for 100% coverage of the area. The excavation will be repeated in lifts as necessary until the scan radiation survey indicates that soil exceeding the IRA Action Level has been removed from that area. One-minute static gamma radiation level measurements will be performed at several locations within this subdivided area following the final excavation lift and scan radiation survey. The static radiation level measurements will be recorded in the appropriate field form. When excavation control scans and static measurement levels at all points are below the IRA Action Level, excavation in the area will be considered complete and ready for the post-IRA status survey. The static radiation level measurements collected during the excavation control survey may be used as a part of the post-IRA status survey.

3.1.3 Soil Sampling for IRA-Specific Correlation

Surface soil samples will be collected during construction in order to update the direct gamma radiation level to soil Ra-226 concentration correlation which was developed for the RSE. The spatial relationship between the sample and the detector, sample geometry and secular equilibrium between Ra-226 and Bi-214, for the in-situ measurements is established by performing a site specific correlation. Generally in normal atmospheric conditions, only less than 25% of the radon from soil emanates out of the soil matrix, resulting in a secular equilibrium of over 75% in the field during the in-situ measurements. The correlation analysis will be conducted as per SOP-2 and SOP-15 using at least 10 to 15 surface soil samples in both the unnamed arroyo and step-out areas collected from locations coincident with stationary gamma scan locations, consistent with the RSE Work Plan.

Separate correlations are required for the NECR-1 step-out areas and the unnamed arroyo due to differences in the geometry of the arroyo channel versus the flat ground surface north of NECR-1. The correlation sample locations will be chosen in the field in a judgmental manner at a range of activity levels. The soil samples will be analyzed for Ra-226 only. A regression with an R^2 value of at least 0.8 will be used for converting the direct gamma radiation levels to Ra-226 soil concentrations. The correlations conducted for the Supplemental RSE for the NECR1 step-out and Home Sites areas were developed using regression analysis. The correlation achieved an R^2 value of 0.9 (greater than the 0.8 R^2 value required in the RSE).

3.1.4 Documentation and Evaluation of the Excavation Control Survey Results

Since the Ra-226 soil IRA action level is converted as the instrumentation count rate of the direct gamma radiation level using the IRA-specific correlation, conversion of the scan radiation survey counts during the excavation control survey data to Ra-226 concentration in pCi/g is not necessary. The excavation and removal field decisions will be made based on the count rates observed by the instrument. The excavation will be controlled using a gamma radiation level of 5,070 cpm for collimated detector and a level of 16,360 cpm for bare detector. Following the final scan radiation survey showing that the excavated area is below the cleanup level, notation will be made in the Scan/Walkthrough Gamma Radiation Survey Field Form (see SOP-3) indicating radiation levels less than the Action Level or the highest level observed.

3.2 POST-IRA STATUS SURVEY

Subsequent to completion of IRA excavation activities, a post-IRA status survey will be implemented that is consistent with MARSSIM guidance (EPA, 2000). The objective of the post-IRA status survey is to confirm that soils with Ra-226 in excess of the IRA Action Level have been removed from the IRA areas. Because the areas are being addressed due to Ra-226 impacts in excess of 2.24 pCi/g (the RSE FSL), they are considered Class 1 Areas and will therefore require a Class 1 Final Status Surveys subsequent to the final Removal Action. This post-IRA status survey is meant only to confirm that excavation activities have met the objectives of the IRA. However, the data collected during the survey may be included in the final Status Survey at a later date. A confirmational soil-sampling plan will be developed for the final Status Survey.

A radiation survey was designed in Section 3.7 of the RSE Work Plan consistent with MARSSIM to support Data Quality Objectives (DQOs) for Class 1 areas. The number of data points was determined using the Wilcoxon Rank Sum (WRS) test per MARSSIM guidance with statistical parameters selected to achieve a low error rate. Since the areas undergoing the IRA are Class 1 Areas, the post interim action status gamma survey will be conducted consistent with the RSE Work Plan for Class 1 Areas (MWH, 2006). Therefore, the post-IRA status survey will consist of Ra-226 soil concentration measurement by static direct gamma radiation measurements collected on an 80-foot grid in each area. Soil samples will be collected for laboratory analysis for Ra-226 at a minimum of 5% of the post-IRA status survey locations. If collecting 5% confirmation samples does not result in a minimum of 20 samples, additional soil samples will be collected to provide a minimum of 20 soil samples for laboratory analysis. Paragon labs will conduct the sample analysis via gamma spectroscopy method 901.1 and will report results to a limit of 1 pCi/g.

3.2.1 Post-IRA Status Survey Instrumentation

The instrumentation to be used for the post-IRA status survey will be the same as that used for the excavation control survey, as discussed in Section 3.1.1. The equipment will consist of a 2x2 NaI scintillation detector (such as Eberline SPA-3) for detection of gamma radiation, connected to a

portable ratemeter/scaler (such as Ludlum 2221). The gamma radiation levels in count rates will be converted to equivalent Ra-226 concentrations using the IRA-specific correlation, as discussed in Section 3.1.3.

3.2.2 Gamma Radiation Survey Protocol

The static direct gamma radiation level survey will be performed at 80-foot triangular grid nodes in each area. The grid nodes will be determined using Visual Sampling Plan (VSP) on an 80-foot triangular grid cast on a random origin during the RSE. The static radiation survey in the unnamed arroyo will be performed at perpendicular transects at 80-foot spacing across the IRA area. Three static radiation level measurements will be performed from each transect, one at each edge of the arroyo and one at the midpoint.

The static direct gamma radiation level measurements for the post-IRA status survey will be conducted following the IRA and the remedial action support surveys. The grid nodes will be field located using a DGPS using the grid node location coordinates from the RSE and SRSE. A daily function check of the instruments will be performed. The MDC for the static radiation survey will be calculated using the daily background count rate. A one-minute static direct gamma radiation level measurement with the collimated detector at approximately 12 inches above the ground surface will be performed at each 80-foot grid node in accordance with SOP-3. The direct gamma radiation level measurement with the location coordinates will be recorded in the Static Radiation Survey Field Form (see SOP-3). If any of the post-IRA status survey gamma readings are above 2.24 pCi/g Ra-226, the location will be further investigated using a scan radiation survey and marked as needed for addressing residual impacts.

The static gamma radiation survey results with the location coordinates will be documented in the field forms, Attachment C to SOP-3. The detector count rates obtained from the static gamma radiation survey will be converted to soil Ra-226 concentrations using the updated correlation.

The surveying conducted during excavation, which will have been conducted at 100% coverage, will be used to augment the post-IRA status survey data. Surface soil sampling will be conducted as part of the final removal action and therefore will not be conducted as part of the interim action, other than those collected for the correlation analysis.

4.0 RADIATION PROTECTION PROGRAM

A radiation protection program, as summarized in this section, will be incorporated into the Site Health and Safety Plan (HASP) to provide protection against ionizing radiation to workers, the general public, and the environment during the IRA. The HASP will be provided for EPA's review and comment in accordance with the approved schedule, prior to implementation of the IRA. The potential for radiological hazard during the IRA would be from uranium and its decay products. The radiation protection program will comply with applicable requirements of the U.S. Occupational Safety and Health Administration (OSHA) regulations 29 CFR Part 1910.1096 for internal and external ionizing radiation. The HASP will include the following components for radiation safety:

- Radiation Safety Organization will be established to implement radiation safety program, including radiation safety training.
- The IRA activities will be conducted to limit any radiation doses to include the following occupational standards:
 - a. The annual limit is the more limiting of:
 - 1. The total effective dose equivalent equal to 5 rems; or
 - 2. The sum of the deep-dose equivalent and committed dose equivalent to any individual organ equal to 50 rems.
 - b. The annual limits to the lens of the eye and to the skin are:
 - 1. An eye dose equivalent of 15 rems; and
 - 2. A shallow-dose equivalent of 50 rems to the skin or to any extremity.
 - c. The annual occupational dose limits for a minor (under the age of 18 years) is 10% of the annual dose limits for an adult as discussed above.
 - d. The radiation dose limit to an embryo/fetus during entire pregnancy, due to occupational exposure of a declared pregnant woman, will be 0.5 rem (500 mrem).
- The IRA activities will be conducted to limit dose for individual members of the public as follows:
 - a. Total effective dose equivalent of 0.1 rem (100 mrem) per year to individual members of the public; and
 - b. Maximum dose rate of 0.002 rem/hour in the unrestricted area from external radiation sources.
- Radiation surveys and monitoring will be implemented to evaluate the magnitude and extent of radiation levels, airborne concentrations and quantities of radioactive material; and potential radiological hazards.
- Personal monitoring for internal and external exposure, as necessary.
- Personnel and equipment decontamination and monitoring.
- Use of administrative and engineering controls, as necessary, to control internal and external radiation exposures.
- Use of personal protective equipment, including respiratory protection equipment, as necessary.
- Internal and external radiation dose assessment.

Records of radiological monitoring, surveys, safety meetings and trainings, investigations and corrective actions will be maintained.

5.0 SUBMISSION OF PROPOSED SCHEDULE AND INTERIM REMOVAL DELIVERABLES TO EPA AND NNEPA

Within the number of Working Days (a day other than Saturday, Sunday and Federal Holidays) specified below which shall run from the Effective Date of the AOC, UNC/GE will submit to EPA with a copy to NNEPA, as provided in the AOC, the following additional deliverables, in accordance with the requirements of this Work Plan and the AOC. Unless otherwise agreed to by EPA, all submittals required by this Work Plan will be subject to two-week EPA review and approval as provided in the AOC:

- a. Proposed IRA Schedule, listing timing for all Tasks and Plans covered by this Work Plan (including all plans below and the As-Built Report) – 10 working days from the Effective Date;
- b. Proposed Health & Safety Plan ("HASP") – 10 Working Days from the Effective Date;
- c. Proposed Communication Plan (including Field Change Protocol) – 10 Work Days from the Effective Date;
- d. Proposed Temporary Relocation Plan – 10 Working Days from the Effective date;
- e. Proposed Traffic Plan - 10 Working Days from the Effective Date;
- f. Proposed Construction Plan – 15 Working Days from the Effective Date;
- g. Proposed Erosion and Stability Plan- 15 Working Days from the Effective Date;
- h. Proposed Vegetation Survey and Vegetation Cover Plan – 45 Working Days from the Effective Date; and
- i. Proposed Red Water Pond Road Characterization Plan – 15 Working Days from the Effective Date;

MWH will use the previously EPA-approved Quality Assurance Project Plan (QAPP) and Sampling & Analysis Plan (SAP) provided in the August 30, 2006 Final Removal Site Evaluation Work Plan for this work. Plans identifying the proposed sampling locations will be included in the Construction Plan and Red Water Pond Road Characterization Plan.

In addition to the hard copies specified in the AOC, an electronic copy of all deliverables created pursuant to this Work Plan should be provided electronically to the following email addresses:

Andrew Bain: Bain.Andrew@epa.gov

Harry Allen: Allen.HarryL@epa.gov

David Taylor: davidataylor@navajo.org

Freida White: freidasw@juno.com

Stanley Edison: pasi_swa@hotmail.com

Michèle Dineyazhe: dineyazhe.michele@epa.gov

6.0 INTERIM REMOVAL ACTION AS-BUILT REPORT

Subsequent to the IRA field activities, UNC will prepare an as-built report. The report will provide a detailed description of the IRA activities that were performed, as well as descriptions of any deviations from the work plan, and the gamma surveying and soil analytical results. An updated base map with revised topography will be prepared and will show the extent of IRA activities.

7.0 REFERENCES CITED

Ecology & Environment (E&E), 2007. *NECR Home Site Investigation Trip Report, NECR Home Sites, Red Water Pond Road, Church Rock, McKinley County, New Mexico.*

EPA, 2000a. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, EPA 402-R-97-016, Rev. 1.

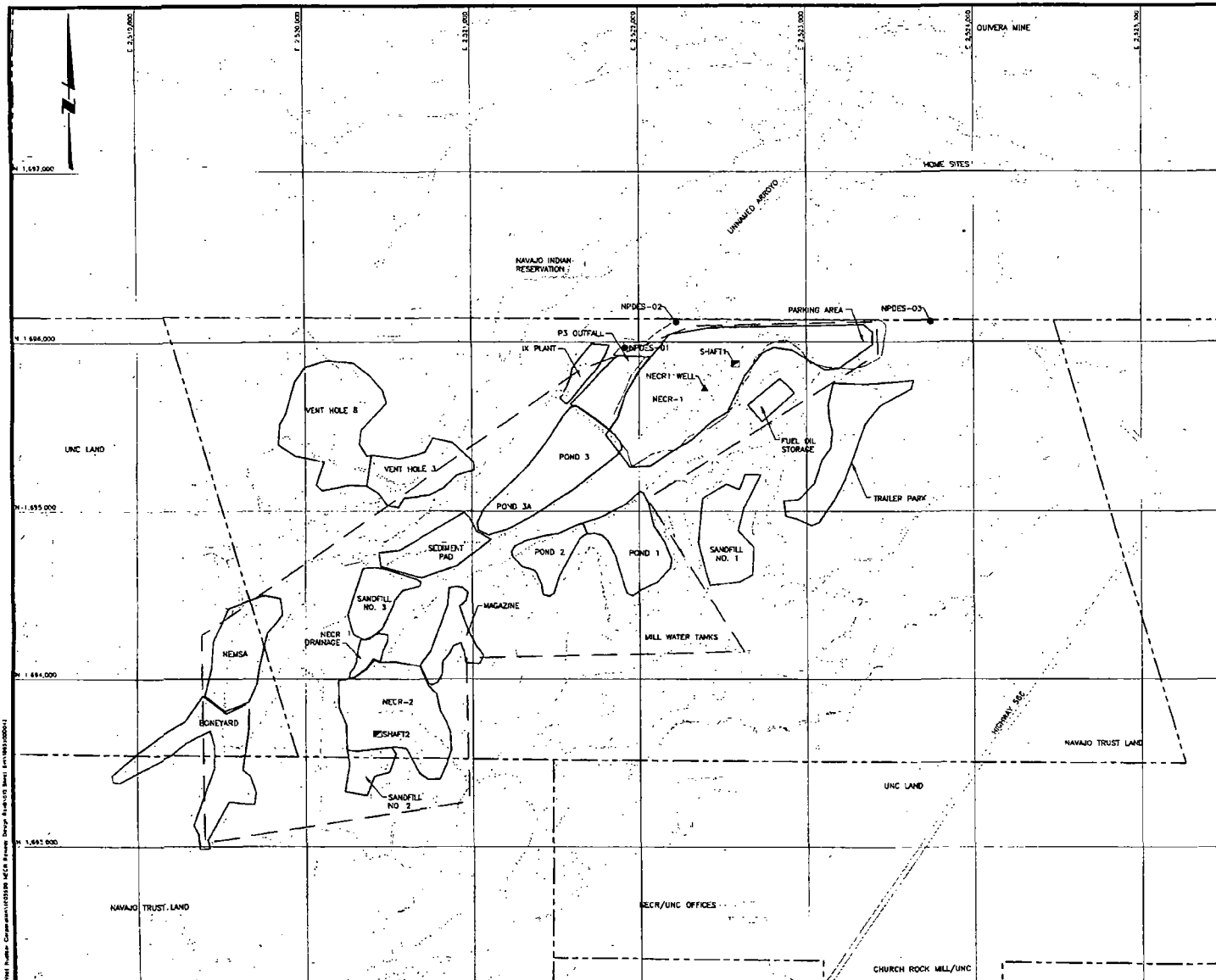
MWH, 2005. *Storm Water Pollution Prevention Plan*, Northeast Church Rock Mine Site.

MWH, 2006. *Removal Site Evaluation Work Plan*, Final, Northeast Church Rock Mine Site.

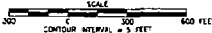
MWH, 2007. *Removal Site Evaluation Report*, Final, Northeast Church Rock Mine Site.

MWH, 2008. *Supplemental Removal Site Evaluation Report*, Draft, Northeast Church Rock Mine Site.

Figures



- LEGEND:**
- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
 - PERMIT BOUNDARY
 - FACILITY BOUNDARY
 - APPROXIMATE TOWNSHIP BOUNDARY
 - ROADS
 - NATURAL DRAINAGE
 - PHYSICAL STRUCTURE
 - NPDES LOCATION
 - ▲ WELL LOCATION
 - SHAFT LOCATION



DESIGNED BY: T.J. COON				CHECKED BY: T.J. COON			
DRAWN BY: LAMAR				APPROVED BY: T.J. COON			
DATE: 06/26/06				DATE: 06/26/06			
PROJECT MANAGER: T.J. COON				CLIENT APPROVAL:			
CLIENT REFERENCE NO:				PROJECT LOCATION:			

PROJECT LOCATION: NORTHEAST CHURCH ROCK MINE

PRODUCT: INTERIM REMOVAL ACTION WORK PLAN

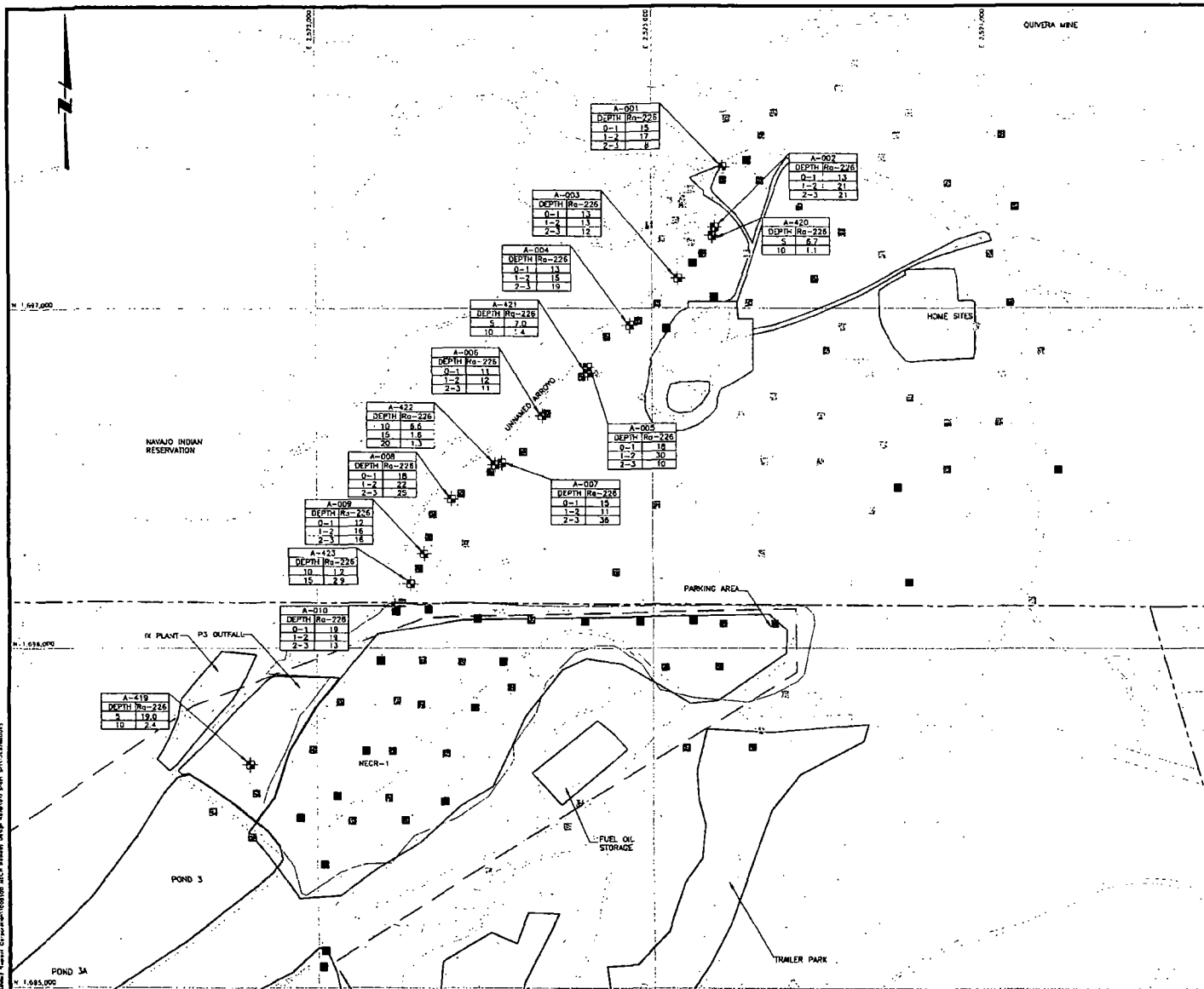
TITLE: SITE LAYOUT

FIGURE: 1 OF 4

FILE NAME: 10055000342

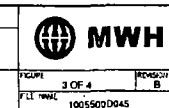
UNC P.O. BOX 3077 Gallup, New Mexico 87305-3077

MWH



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DESIGNED BY	FAJLSON	08/25/08		DESIGNED BY	FAJLSON	08/25/08	
DRAWN BY	CLARK'S	08/25/08		DRAWN BY	CLARK'S	08/25/08	
CHECKED BY	FAJLSON	05/25/08		CHECKED BY	FAJLSON	05/25/08	
APPROVED BY	FAJLSON	08/25/08		APPROVED BY	FAJLSON	08/25/08	
PROJECT MANAGER	FAJLSON	08/25/08		PROJECT MANAGER	FAJLSON	08/25/08	
CLIENT APPROVAL				CLIENT APPROVAL			
CLIENT REFERENCE NO.				CLIENT REFERENCE NO.			

<p>PROJECT LOCATION:</p> <p>NORTHEAST CHURCH ROCK MINE</p>		<p>PROJECT:</p> <p>INTERMEDIATE ACTION WORK PLAN</p>	
<p>FILE:</p> <p>REMOVAL SITE EVALUATION SOIL ANALYTICAL RESULTS</p>		<p>FIGURE:</p> <p>3 OF 4</p>	
<p>FILE NAME:</p> <p>10015000045</p>		<p>REVISION:</p> <p>B</p>	



Appendix A

APPENDIX A
STANDARD OPERATING PROCEDURES

SOP-1a
AVM Environmental Services, Inc.
CALIBRATION OF THE SCALER RATEMETER And the 2"x2" NaI SETECTOR
For Gamma Radiation Survey @ UNC's NECR Mine Site

1. SCOPE

1.1 Purpose

To provide a standard procedure for calibration of the Ludlum Ratemeter, model 2221 with a 2"x2" NaI Scintillation Detector (the Ludlum 44-10 or Eberline SPA-3).

The Ludlum 2221 is a portable, battery operated, self-contained counting instrument designed for operation with scintillation, proportional or G-M detectors. When combined with a 2"x2" NaI scintillation detector, the Ludlum 2221 is used for the detection and measurement of gamma radiation. This instrument configuration is used for detection of surface soil gamma radioactivity.

1.2 Applicability

This instrument will be calibrated every twelve months, after repairs, or when the instrument function check fails. This method can be used with any Scaler/Ratemeter with a 2"x2" NaI scintillation detector configuration.

2. REFERENCES

- 2.1 Technical Manual for Scaler Ratemeter, Model 2221

3. REQUIREMENTS

3.1 Tools, Material, Equipment

- 3.1.1 Small screwdriver.
- 3.1.2 Ludlum Model 500 Pulser or equivalent.
- 3.1.3 A source of sufficient gamma radiation activity to allow a response for high voltage plateau and function check. A 1% uranium ore in a sealed can is used.
- 3.1.4 Efficiency calibration for Ra-226 gamma survey is performed using DOE Grants calibration site (GPL).

3.2 Precautions, Limit

- 3.2.1 The detector to Scaler/Ratemeter connector cable could easily be damaged if the weight of the 2"x2" NaI detector is suspended with it.
- 3.2.2 The NaI scintillation crystal is fragile. Shock to the crystal could cause a fracture or a crack, which could impact operation.

- 3.2.3 Do not leave the reading lamp on for any length of time as it will rapidly drain the battery voltage.

3.3 Acceptance Criteria

The instrument response to the calibration source should be within $\pm 20\%$.

4. LUDLUM 2221 OPERATION CALIBRATION

Record Scaler/Ratemeter information (model and serial number) on the Scaler/Ratemeter Calibration Form. Record information about the calibration source (Pulser and/or source, 1% uranium ore standard).

- 4.1 Check the battery condition by pressing the "BAT" button with instrument switched on. If the meter does not indicate the battery charge above 5.3 volts, replace the four (4) D-cell batteries.
 - 4.2 Set the threshold value as follows:
 - 4.2.1 With the instrument turned on, press the threshold button. Read the displayed reading. If necessary adjust the "THR" adjustment screw until the threshold reads 100.
- NOTE: The "THR" adjustment screw is located under the calibration cover
- 4.3 Set the WIN (window) IN/OUT to OUT.
 - 4.4 Connect the Ludlum 500 Pulser to the 2221.
 - 4.5 Switch SCALER/DIG RATEMETER switch to DIG RATEMETER.
 - 4.6 Select 400 CPM on the Pulser (multiplier switch to 1 and count rate adjusted to 400 cpm).
 - 4.7 Adjust the pulser amplitude above the set threshold (100 mV) until a steady count rate is observed.
 - 4.8 Record the meter rate count response in AS FOUND column on the calibration form. If the meter response is not within 10% of the Pulser set count rate of 400 cpm, adjust the R40 Meter Cal (Labeled MCAL) on the processor board for 400 cpm on the meter.
 - 4.9 Repeat steps 4.6 to 4.8 for 4000, 40,000 and 400,000 cpm pulses.
 - 4.10 Switch the SCALER/DIG RATEMETER switch to SCALER. Select Count Time to 1 Minute.
 - 4.11 Select 400 counts on the pulser (multiplier switch to 1 and count rate adjusted to 400)
 - 4.12 Count the pulses on the meter for one minute by pressing COUNT switch.
 - 4.13 Record the meter response counts in AS FOUND column on the calibration form. If the

meter count is not within 10% of the pulser set counts of 400 cpm, adjust the R40 Meter Cal (Labeled MCAL) on the processor board and repeat step 5.12 until a count of 400 is observed on the meter.

- 4.14 Repeat steps 4.11 to 4.13 for 4000, 40,000 and 400,000 pulses.

If the meter reading could not be set within 10% of the pulses generated by the pulser, the meter requires repair and calibration prior to use.

The Ludlum 2221 is ready for detector calibration and operation.

5. DETECTOR HIGH VOLTAGE AND BACKGROUND CALIBRATION

Record Scaler/Ratemeter (Ludlum 2221) and 2"x2" NaI detector (Eberline SPA-3 or Ludlum 44-10) information (model and serial number) on the Scaler/Detector Calibration Form. Record information about the calibration source (1% uranium ore standard).

- 5.1 Connect the calibrated Ludlum 2221 to the 2"x2" NaI detector.
- 5.2 Turn the Ludlum 2221 ON. Set WIN ON/OFF to OFF.
- 5.3 Check Threshold setting. Should be at 100 mV.
- 5.4 Switch SCALER/DIG RATEMETER switch to SCALER. Select Count Time to 1 Minute.
- 5.5 Set HV to 500 VDC.
- 5.6 Expose the detector to the 1% uranium ore can by placing directly under the detector.
- 5.7 Obtain one-minute counts with the detector exposed to the source at every 50-volt increment until voltage plateau is passed and sudden increase in the counts is observed. (Usually the for the 2"x2" NaI detector, the high voltage plateau maximum voltage is about 1300 to 1400 VDC.). Record the counts under the READING CPM SOURCE in the calibration form.
- 5.8 Return HV setting back to 500 VDC.
- 5.9 Remove the source away from the detector. Obtain one-minute background counts with the detector shielded from the source at every 50-volt increment until similar voltage to the source high voltage plateau reading. Record the counts under the READING CPM BACKGROUND in the calibration form.
- 5.10 Plot voltage versus cpm reading for both the source and background high voltage data. From the plot, select the optimum operating high voltage, which is usually at least about 50 volts above the knee of the plateau curve for a greater counting stability. The optimum high voltage should be also within the background plateau curve for background counting stability.
- 5.11 Set the Ludlum HV at the optimum operating voltage determined above.

The Ludlum 2221 and the 2"x2" NaI detector configuration is ready for efficiency calibration and establishing the operating background and source function check.

6. OPERATING BACKGROUND AND SOURCE FUNCTION CHECK DETERMINATION

- 6.1 Set the Ludlum 2221 to Scaler mode, Count Time at 1 minute, with WIN OUT and THR at 100.
- 6.2 Remove any type of sources away from the detector. Obtain five one-minute background counts. Record the background counts in the calibration form. Average the five one-minute background counts. Record the average background counts in the calibration form. The daily function check background counts should be within 20% of this average.
- 6.3 Expose the 1% uranium ore source (in the sealed can). Note the exact location of the source to the detector. Obtain five one-minute background counts with the detector exposed to the source. Record the source counts in the calibration form. Average the five one-minute source counts. Record the average source counts in the calibration form. The source position to the detector for the function check should be exactly the same as this calibration, and the source counts for the daily source function check counts should be within 20% of this average.

7. EFFICIENCY CALIBRATION

- 7.1 Using the Map in the DOE Field Calibration Report (DOE/ID/12584-179) go to the Grants calibration site. Locate GPL pad (87.78 pCi/gm Ra-226, 0.50 pCi/gm Th-232 and 15.58 pCi/gm K-40) as shown in the Grants Calibration Site layout in the DOE report.
- 7.2 Set the Ludlum 2221 to Scaler mode, Count Time at 1 minute, with WIN OUT and THR at 100.
- 7.3 Obtain five one-minute counts with detector at the center of the pad at about 12 inches from the pad surface. Record the counts on the Calibration Form. Also obtain five one-minute counts with detector collimated at same height and record the counts on the Form.
- 7.4 Average the five calibration counts (cpm) and record on the form and calculate efficiency for collimated and uncollimated (bare) detector.

Efficiency (cpm/pCi/gm) = Cal Pad average one-minute counts (cpm)/87.78 pCi/gm

This efficiency may be used for calculating instrument Minimum Detectable Concentration (MDC).

8. MINIMUM DETECTABLE CONCENTRATION CALCULATION

- 8.1 MDC for Static Gamma Radiation Measurement (for 0.05 probability for both false positive and false negative errors)

$$MDC = C \times [3 + 4.65 \sqrt{B}]$$

Where

C = Detector calibration factor, pCi/gm/cpm (for this survey as determined above).

B = Number of background counts that are expected to occur while performing a sample measurement.

Example: If the background count from the function check for the detector is 7862 cpm, and the detector efficiency is 0.001418 pCi/gm/cpm (705 cpm/pCi/gm), then the MDC for a one minute static measurement would be:

$$\text{MDC} = 0.0014 \text{ pCi/gm/cpm} \times [3 + 4.65\sqrt{B}] (7862 \text{ cpm}) = 0.59 \text{ pCi/gm}$$

8.2 MDC for Scan Gamma Radiation survey

The scan MDC is assumed for a scan rate of about 3 feet per second and a one second interval (based on a detector that is focused on about 36 inches diameter area at about 12 inches from ground surface). Also, a surveyor efficiency (p) of 0.5 is assumed. First calculate the Minimum Detectable Count Rate (MDCR) as follow:

$$\text{MDCR} = d' \times \sqrt{B_i} (B_i \times (60/i))$$

Where:

d' = value for true positive and false positive proportion. A value of 1.38 will be used for 95% true and 60% false positive proportion.

B_i = number of background counts in the interval i (cpm/60 sec/min for one second interval).

For a detector background count of 7820 cpm, the MDCR for one second interval would be:

$$\text{MDCR cpm} = (1.38) \times \sqrt{B_i} (7820 \text{ cpm} \times 1 \text{ sec} \times 1 \text{ min}/60 \text{ sec}) \times 60 \text{ sec/min} = 945 \text{ cpm.}$$

Then calculate the MDCR_{surveyor} using surveyor efficiency (p) of 0.5 as follow:

$$\text{MDCR}_{\text{surveyor}} = \text{MDCR} / \sqrt{p} = 945 \text{ cpm} / \sqrt{0.5} = 1,337 \text{ cpm.}$$

From the MDCR_{surveyor}, calculate the scan MDC using the following:

$$\text{Scan MDC} = \text{MDCR}_{\text{surveyor}} \text{ cpm} \times C, \text{ pCi/gm/cpm}$$

Where: C = Detector calibration factor, pCi/gm/cpm (for this survey as determined above).

For a C of 0.0014 pCi/gm/cpm (705 cpm/pCi/gm), the Scan MDC would be:

$$\text{Scan MDC} = 1,337 \text{ cpm} \times 0.0014 \text{ pCi/gm/cpm} = 1.87 \text{ pCi/gm}$$

The integration count time for static measurement may be increased, and the scan rate for radiation scan survey may be reduced to lower MDCs to desired levels. The Ludlum 2221/2"x2" NaI detector configuration is ready for a site-specific soil Ra-226 to gamma radiation level calibration (SOP-2a) and performing field gamma radiation survey (SOP-3a). A daily function check must be performed prior to use.

Attachment A, SOP #RAD-01a
AVM Environmental Services Inc.

Scaler/Ratemeter Calibration Form

Model _____ S/N _____

Calibration Source _____

Threshold (input sensitivity), Found at _____ mV Left or Set at _____ mV

Window, In/Out _____ Window _____ mV

Pulser Amplitude Set @ _____ mV

Range/Mode	Calibration Point (Pulser Setting) cpm x multiplier	As Found Reading	Left or Set Reading
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

HV Set @ _____ VDC

Date _____ Calibrated By _____

**Attachment B, SOP #RAD-01a
AVM Environmental Services Inc.
Scaler/Ratemeter - Detector Calibration Form**

Scaler/Ratemeter _____
Detector _____

Source: _____ Strength: _____

Scaler/Ratemeter Threshold set @ _____ mV, Window IN/OUT _____, Window _____ mV

HV	Reading, CPM (Source)	Reading, CPM (Background)	Background reading at designated function check location in office.	
500	_____	_____	Count #	Reading (CPM)
550	_____	_____	1	_____
600	_____	_____	2	_____
650	_____	_____	3	_____
700	_____	_____	4	_____
750	_____	_____	5	_____
800	_____	_____	Average	_____
850	_____	_____	Count Readings with 1 percent U ₃ O ₈ can directly under shielded probe on designated function check location in office.	
900	_____	_____		
950	_____	_____	Count #	Reading (CPM)
1000	_____	_____	1	_____
1050	_____	_____	2	_____
1100	_____	_____	3	_____
1150	_____	_____	4	_____
1200	_____	_____	5	_____
1250	_____	_____	Average	_____
1300	_____	_____	Count Readings with 1 percent U ₃ O ₈ can directly under shielded probe on designated function check location in office.	
1350	_____	_____		
1400	_____	_____	Count #	Reading (CPM)
			1	_____
			2	_____
			3	_____
			4	_____
			5	_____
			Average	_____

HV Set @ _____ VDC (Instrument) _____ VDC (DVM Fluke 80201)

Input Sensitivity (THR), mV _____

Function Check with 1 percent U₃O₈ ore in can. Can Directly under the detector.

Acceptable Function check range is: _____ to _____ CPM

Count Readings for Calibration Pad GPL (87.78 pCi/gm Ra-226)

Bare (Uncollimated)		Collimated	
#1	_____ cpm	#1	_____ cpm
#2	_____ cpm	#2	_____ cpm
#3	_____ cpm	#3	_____ cpm
#4	_____ cpm	#4	_____ cpm
#5	_____ cpm	#5	_____ cpm
Average	_____ cpm	Average	_____ cpm
Eff (avg cpm/87.78 pCi/gm)	_____ cpm/pCi/gm	Eff	_____ cpm/pCi/gm

Date _____

By _____

SOP -2a
AVM Environnemental Services, Inc.
Direct Gamma Radiation Level to Ra-226 Soil Concentration Correlation
For UNC's NECR Mine Site

1.0 Purpose

The purpose of this procedure is to develop a correlation between Ra-226 concentrations in surface soil and direct gamma radiation level. The correlation is developed basically for a site-specific calibration of field instrumentation (2'x2' NaI scintillation detector), for determining Ra-226 concentration in surface soil by performing direct gamma radiation level survey. The correlation will be used to determine Ra-226 concentrations in surface soils by direct gamma radiation survey at the Northeast Church Rock Mine Site (NECR).

2.0 Scope

Ra-226 is primarily an alpha emitting radionuclide with a gamma radiation emission of 186 KeV at about 4% intensity. This low energy and intensity of the Ra-226 gamma radiation emission makes impractical to determine Ra-226 in the field by direct gamma radiation measurement. However Bi-214, a Ra-226 decay product, emits high energy gamma radiations (46.3 % intensity @ 609.3 keV, 15.1% intensity @ 1120.3 keV and 15.8% intensity @ 1764.3 keV) at a total of approximately 80% intensity. The gamma radiations of Bi-214 can be easily and accurately measured in the field utilizing a NaI scintillation detector, such as 2x2 NaI Scintillation detector having high gamma radiation sensitivity. The Ra-226 levels in soil could be measured as a surrogate for gamma measurement of Bi-214 gamma radiation levels, as to the measurement described in Section 4.3.2 of the MARSSTM. Bi-214 is a decay product of Ra-226 through radon-222, a gaseous form, some of which emanates from soil. This phenomenon results in activity disequilibrium between Ra-226 and Bi-214 in the soil. The Rn-222 gas emanation fraction from the soil varies with different geometric characteristics of a particular soil. Therefore, a site-specific calibration is necessary. Previous studies have shown that about 20% of the Rn-222 gas decayed from Ra-226 in soil emanates out of the surface soil, indicating that significant (about 80%) of this would decay into Bi-214 in the soil matrix.

If the soil geometry and other parameters such as moisture, radon emanation fraction, contamination distribution profile, gamma ray shine from nearby sources, and land topography are consistent, the ratio of Bi-214 to Ra-226 would be consistent. This means there would be a direct correlation between Bi-214 gamma radiation levels and Ra-226 concentrations in the soil. The gamma radiation from other naturally occurring isotopes in soil, such as and Th-232 decay products and K^{40} , may contribute to gross gamma radiation intensity. In addition, background gamma radiation from cosmic rays also contributes to gross gamma radiation intensity. However, the gamma radiation level from such naturally occurring isotopes and sources are generally at a constant level. A linear regression would identify such a constant to correct for and minimize interference with the gamma radiation level and Ra-226 soil concentration correlation.

The correlation procedure is designed to calibrate a 2"x 2" NaI scintillation detector by determining a site-specific correlation between gamma radiation level and Ra-226 concentration in soil. The gross gamma radiation intensity (count rate) will be measured at ten locations. Soil samples will be collected from these locations for Ra-226 analysis by an off-site laboratory. The locations of the soil samples and gamma radiation level measurement for correlation may be based on the predominant concentration expected in field or concentration of interest. Direct gamma radiation level or gamma

radiation exposure rate measurements may be made to select sampling locations. A linear regression will be performed between gamma radiation count rate and corresponding Ra-226 concentrations in soil to determine the Correlation. The goal is to attain a correlation coefficient (r^2) of 0.8 or better.

Ra-226 contamination in soil at the NECR varies from background level to over 100 pCi/gm distributed in surface (0-6") to subsurface soils. The removal action of the contaminated soil at the NECR is expected to change the contamination distribution and concentration to a fairly homogeneous distribution at or near the cleanup level in surface soils. Therefore, the contamination distribution assumption for correlation for remedial action support survey and final status survey will be for homogeneous distribution in surface soils near the cleanup level concentration.

3.0 Instrumentation

A 2"x2" NaI Scintillation detector (an Eberline SPA-3 or Ludlum 44-10 detector) and a Scaler/Ratemeter, (Eberline ESP-1/2 or Ludlum Model 2221) will be used for field gamma radiation level measurements and to select sampling locations. The Scaler/rate meter will be calibrated, using SOP -1a to assure that it properly counts the electronic pulse generated and sent by the detector. An optimum operating high voltage for the detector will be established by performing a high voltage plateau on the detector using SOP -1a. The input sensitivity (threshold) of the Scaler/Ratemeter will be set @ 100 mV to avoid interference from low level background radiation. The pulses generated by the detector for gamma radiation (609 KeV) from Bi-214 are significantly higher than 100 mV, as verified by using 1% uranium ore standard.

During the excavation control survey (remedial action support survey), it is likely that the Ra-226 concentration in soil near the excavated areas is elevated. Gamma radiation shine from such areas may interfere with gamma radiation level measurement at excavated areas, as the high energy gamma radiation can travel long distance in air, up to 50 feet, before ionizing. If needed, shine interference will be reduced by placing the detector in a 0.5-inch thick collimated lead shield. In addition to obtaining a correlation for a bare (uncollimated) detector, a correlation will also be developed for a lead collimated detector by obtaining gamma radiation level measurements for both collimated and uncollimated detector at each location.

A radiation survey in the arroyo for bed sediment would require different geometry of the survey system detector compared to surface soils in a fairly plain geometry. During the radiation survey for arroyo bed sediments, gamma radiation shine from the arroyo banks would also interfere with the survey. Therefore, a separate correlation with soil samples and gamma radiation levels would be developed for survey in the arroyo.

4.0 Gamma Radiation Level Measurements and Soil Sample Collection for Correlation

Gamma radiation measurements for the correlation will be performed using static gamma radiation survey as described in the SOP -3a. The gamma radiation survey and surface soil sample locations will be identified by gamma ray count rate to retrieve the desired range of concentrations from background to about 10,000 cpm with collimated detector for correlation for excavation control and Post-IRA status survey. The sampling location will be spread through the correlation range. The selected sampling location areas will be relatively flat terrains, and large enough so that moving around several steps in each direction should not affect readings significantly. For the selected sample location, three one-minute counts will be obtained at each location. The detector will be approximately 12 inches from the ground surface.

Soil samples for the correlation will be collected using surface soil sampling SOP-15. A five-point composite sample at a depth of 0" to 6" will be collected from each of the gamma radiation level measurement location. One soil sample aliquot point will be from the center point directly under the detector, and the other four aliquots from four points that are 12 inches from the center points in four directions (90 degrees apart). Each soil sample aliquot will be approximately 200 grams, collected by using the hand scoop method if soil texture is loose, or a using a hand augur if soil texture is sufficiently compacted. The sampling locations will be marked with flags. The five 200-gram soil sample aliquots will be combined (total of 1000 gram) in a mixing bowl, homogenized and placed in a sample bag. Each sample bag will be marked and labeled with appropriate sample identification. Soil sampling equipment will be decontaminated between each sampling location using SOP-5. Soils samples will be shipped to an off-site vendor laboratory for Ra-226 analysis using EPA gamma spectroscopy method 901.0.

5.0 Linear Regression Analysis

To determine the correlation between gamma radiation level counts and corresponding Ra-226 concentration in soil content, i.e. to determine a calibration equation, a liner regression analysis will be performed on the sample Ra-226 concentration in pCi/gm, Y, and the associated gamma radiation level count rate, cpm at X, from all the sample locations using a least-square liner regression and plotting the results.

Linear regression data will be summarized by the generalized equation:

$$Y = mX + b$$

where,

Y = soil concentration in pCi/gm,

m = slope, pCi/gm/cpm

X = count rate (the mean) in cpm

b = constant, y intercept

This correlation will provide a site specific calibration factor (m) in pCi/gm/cpm for the 2"x2" NaI detector, with a constant (b) to correct for any interference, specifically at lower range.

SOP-3a
AVM Environmental Services, Inc.
Field Gamma Radiation Survey for Ra-226 Concentration in Soil
@ UNC's NECR Mine Site

1.0 SCOPE

1.1 Purpose

This procedure will be used to determine the Ra-226 concentration in surface soil by direct gamma radiation level survey for conducting Excavation Control (Remedial Action Support) survey for the Interim Removal Action (IRA) and for the Post-IRA survey at the Northeast Church Rock Site (NECR).

1.2 Applicability

This SOP will be used by AVM Environmental Services, Inc for performing Excavation Control (Remedial Action Support) survey for the IRA and as a component of the Post-IRA survey at the Northeast Church Rock Site.

2.0 EQUIPMENT AND MATERIALS

- 2.1 Ludlum 2221 or Eberline ESP Scaler/Rate meter coupled with a Ludlum 44-10 or an Eberline SPA-3 2"x2" NaI crystal scintillation detector for direct gamma radiation detection. (SPA-3 and Ludlum 44-10 are both similar 2"x2" NaI crystal scintillation detectors).
- 2.2 A global positioning system (GPS) with real time differential correction capability and a data logger. Currently AVM uses a Starlink Invicta 210S Receiver with antenna unit and TDS Ranger data logger with TDS SOLO surveying software. The Starlink Invicta 210S Receiver is capable of real time differential position correction using OMNI STAR satellite subscription correction or WAAS correction.
- 2.3 Collimating lead shield for the 2"x2" NaI detectors, if needed to reduce gamma-ray shine interference and focus on area of interest under detector. The 0.5-inch thick collimating lead shield, which surrounds the NaI crystal, is contained within a protective marlex housing.
- 2.4 A vendor calibrated exposure (uR/hr) meter.
- 2.5 Map of survey areas with marked grid nodes and transects. Ink pen and appropriate Field Survey Forms to record survey readings and notes.
- 2.6 Measuring tape, pin flags, area markers.

3.0 INSTRUMENT CONFIGURATION & OPERATIONS

Prior to any instrument function check or the operation, the technician will read the Technical Manual for the instrument operations (Ludlum 2221 or ESP-2) and the correlation Method (SOP- 2a) for the rationale behind the gamma radiation surveys.

The field gamma radiation level survey for Ra-226 content in soil will be performed using an Eberline

ESP or Ludlum 2221 Rate meter/Scaler. The Rate meter/Scaler is connected to a 2"x2" NaI crystal scintillation detector (SPA-3 or Ludlum 44-10) which detects gamma radiation emitted from Bi-214, a decay product of Ra-226 in the soil. The detector will be held at approximately 12 inches from the ground surface. For a survey of high energy gamma radiation of 609 to 1700 KeV, the bare (uncollimated) detector should be sensitive to at least an area of about ten feet radius under the detector. The Model 2221 Scaler/Rate meter with external RS232 connector can be coupled to a data logger, also connected to a GPS receiver where the gamma radiation count rate in cpm would be logged with its corresponding location coordinates.

For radiation surveys where significant shine interference is present from nearby areas, the 2"x2" NaI crystal scintillation detector will be installed in a 0.5 inch collimating lead shield to reduce gamma shine interference. For a direct gamma radiation survey in the unnamed arroyo, the detector will be collimated to avoid radiation shine interference from the arroyo banks. The detector shield is contained within a protective marlex housing. During the survey, the detector will be held approximately 12 inches above ground level, which should focus and be most sensitive to approximately 36 inch diameter area under the detector.

The instrumentation must be calibrated consistent with SOP-1a prior to use.

3.1 Instrument Function Check

An operational function check will be performed on the Scaler/Rate meter (ESP or Ludlum 2221) and the detector (SPA-3 or Ludlum 44-10) each day prior to any field surveys. Verify calibration validity for the Scaler/Rate meter and the detector. Calibration date for the instruments must be within one year. If not, the instrument must be calibrated with a certificate in file. The function check will be performed in field office. The following function check procedures will be used and the pertinent information recorded on the Scaler/Rate meter-Detector Function Check Form (Attachment A).

3.1.1 Scaler/Rate meter General Setting

If an Eberline ESP Scaler/Rate meter is used for the instrument configuration, the calibration constant must be set @ 1.0+00; and dead time must be set @ 1.4-05 sec.

If Ludlum 2221 Scaler/Rate meter is used for instrument configuration, the WIN toggle switch must be in the OUT position.

3.1.2 Visual inspection

Perform a visual inspection of the instrument, cables, detector and the shield, checking for signs of any damage. Test for possible electrical shorts in the cable (with the instrument in the audio mode, move the cable and note for any sudden increase in counts on the Scaler/Rate meter).

3.1.3 Calibration Due

Verify calibration validity for the Scaler/Rate meter and the detector. Calibration date for the instruments must be within one year.

3.1.4 Battery charge

Assure that the Scaler/Rate meter battery is functional. For ESP Scaler/Rate meter it should not be indicating a "Low BAT" signal. For Ludlum 2221, the battery voltage digital readout must be at least 5.3 volts.

3.1.5 High Voltage

The detector high voltage must match that determined during high voltage calibration (HV Plateau) for that detector.

3.1.6 Threshold (input sensitivity)

Check and make sure that the Scaler/Rate meter threshold is set at 100 mV. If not, set the threshold at 100 mV. Ludlum 2221 Threshold can be set by the instrument digital read out display.

3.1.7 Window

If Ludlum 2221 Scaler/Rate meter is used for instrument configuration, the WIN toggle switch must be in OUT position.

3.1.8 C.C. Calibration Constant

If an Eberline ESP Scaler/Rate meter is used for the instrument configuration, the calibration constant must be set @ 1.0+00; and dead time must be set @ 1.4-05 sec.

3.1.9 Background Counts

The background counts will be determined for the same time interval as the field survey count time, generally one minute. The background counts will be performed at the designated location in the field office. A location will be designated in the field office for obtaining the required daily background counts. Keep all beta/gamma radiation sources away from the detector while performing the background check. The background function check counts must be within 20% of the background counts obtained during the detector high voltage calibration.

3.1.10 Source Function Counts

Obtain the gamma radiation source, (1% U_3O_8 ore standard sealed in a red can marked Function Check Source"). The 1% ore standard was used to determine the acceptable count range for the detector during calibration. Place the source at the same location on the detector used to obtain the source function check counts during calibration. Count the source for one minute and note the counts in cpm. The source function check counts must be within 20% of the source counts obtained during the detector and Scaler/Rate meter calibration.

3.1.11 Instrument Tolerance

The Scaler/Rate meter-detector detecting and counting tolerance is expressed as percent deviation from the mean of the acceptable count range. The background counts and the source function check counts must be within 20% of the mean established following instrument calibration. If the source count is outside this range, pull the instrument from service. The instrument will be repaired or re-calibrated prior to use.

3.1.12 Technician

After completing the function check, initial in the column marked TECH of the function check form.

3.2 Instrument Minimum Detectable Concentration Calculation

If required, calculate Minimum Detectable Concentration (MDC) for the instrumentation using the function check background readings as described in SOP-1 (Instrument MDC Calculation). Calculate MDC for appropriate survey, i.e. Direct Measurement MDC for static (stationary) gamma radiation survey and scan MDC for scan or walkthrough gamma radiation survey. Record the MDC in the Function Check Form (Attachment A).

4.0 FIELD GAMMA RADIATION SURVEYS

The direct gamma radiation level survey for Ra-226 in surface soil will be conducted as either scan survey (walkthrough) or static survey (stationary) measurements.

4.1 Scan Radiation Survey

Scan radiation surveys (walkthrough surveys) will be performed by walking with the detector at about 12 inches from the ground surface with the scaler/rate meter in count RATE MODE. Scan surveys will be performed within each survey area by walking in a serpentine shape along transects to identify and locate any hot spots and contaminated area boundaries during the excavation control survey. The scan surveys may also be performed as a component of the final status survey.

4.2 Static Radiation Survey

Static radiation surveys will be performed at any point or location of interest during excavation control survey, and at specified grid nodes within survey areas for the final status survey. Also, static survey measurement will be performed at each correlation sampling point. The detector will be held at about 12 inches from the ground surface. The scaler/rate meter will be set in the count SCALER MODE. A one-minute count (cpm) of gamma radiation level will be obtained at each location for static gamma radiation survey.

4.3 Remedial Action Support (Excavation Control) Survey

Excavation control survey will be performed to guide excavation of contaminated soil exceeding the cleanup level during the IRA at the NECR. Consistent with the IRA Work Plan, the Ra-226 IRA off-site action level for contaminated soil at the NECR is 2.24 pCi/gm, which is equivalent to the direct gamma radiation count of 5,214 cpm for the collimated detector. In order to consider the statistical uncertainty associated with radioactive decay, the direct gamma radiation level equivalent to the cleanup level is reduced by 1.96σ (standard deviation) to provide assurance at a 95% confidence level that the measured direct gamma radiation level count is below the cleanup level count 5,214 cpm. Therefore, the direct gamma radiation cleanup level of 5,070 cpm for the collimated detector will be used initially in the field for the excavation control. Cleanup level for the bare (uncollimated) detector will be 16,360 cpm (the 16,619 cpm equivalent to 2.24 pCi/gm reduced by 1.96σ). This direct radiation cleanup level may change as cleanup progresses; therefore, contact your supervisor to obtain the current direct radiation cleanup level. Excavation

control survey will be performed using combination of scan radiation survey and static radiation level measurements as follow:

1. Perform the function check as indicated in Section 4.1 of this procedure. In area, such as north and west of the NECR-1 near the slope, where gamma radiation shine is expected, used the collimated detector.
2. Insure that the Scaler/Rate meter (ESP or Ludlum 2221) is set in RATE mode. Turn the Scaler/Rate meter audio speaker to the ON position. For Ludlum 2221 Scaler/Rate meter, set the RESP (response) toggle switch to F (fast) position. Set the audio rate toggle switch to x1, x10 or x100 position and familiarize yourself to the audio rate at the action level count rate. The audio toggle rate set at x10 is appropriate for the field survey.
3. Using the IRA Work Plan Figure 2 and 4, area boundary location coordinates, and DGPS to field locate and mark appropriate area exceeding the cleanup level with pin flags. Radiation scanning may be necessary between the outer points to delineate the contaminated area boundaries. Coordinate the marked area with the excavation crew. The area may be divided into small subareas such as 100 square meter areas, or 10 feet strips to efficiently control excavation based on equipment used for excavation. The excavation fleet will remove the contaminated soil in necessary thickness lift initially based on vertical extent of contamination.

Prior to performing excavation control in the field, hold a tail gate safety meeting each day with the excavation crew to coordinate safety procedures during the excavation control survey.

IT IS IMPORTANT TO COORDINATE WITH THE EXCAVATION CREW THE EXCAVATION AND SURVEY SEQUENCE FOR YOUR SAFETY. ESTABLISH NECESSARY SAFETY COORDINATION WITH THE EXCAVATION CREW. ALWAYS WEAR AN ORANGE SAFETY VEST WHILE PERFORMING SURVEY IN THE FIELD.

4. Following the initial excavation lift, assure that the excavation equipment is out of the way and the area is clear and safe, perform a radiation scan with the detector at approximately 12 inches from the ground surface by walking in a serpentine pattern along a transect or within the subdivided areas with the audio speaker ON to identify any locations that exceed the site action level count rate by audio response and digital count rate display. The scan survey for the excavation control will be performed for 100% coverage of an area. Note that the collimated detector at about 12 inches from ground is most sensitive within an area of about three feet diameter under the detector, and about 10 feet diameter under the bare detector. The scan gamma radiation survey form (Attachment B) may be used to note any comments.
5. If no point or a location exceeding the action level is identified within the area by the scan, perform one-minute static radiation measurement at several points (about five points within a 100 square meter area) using the static radiation measurement as described in steps 2 through 5 of Section 4.4. Obtain the static measurement point locations using the DGPS. Record the static measurement readings and location coordinates in the static gamma radiation survey field form (Attachment C). If all points are below the cleanup level, the excavation is complete and ready for the Post-IRA status survey. The static radiation measurements may be used as a part of the Post-IRA status survey. If any of these points exceeds the cleanup level, notify the excavation crew and guide the contaminated soil excavation repeating step 4 until all locations or points are below the cleanup level.
6. If the radiation scan following the initial soil excavation lift shows portions the area above the

cleanup level, or any static measurement point is above the cleanup level, mark out those areas with pin flags and coordinate with the excavation crew for the additional excavation of contaminated soil as necessary at those locations until the scan survey shows no points or location above the cleanup level and repeat step 5 at those locations.

7. If the radiation scan following the initial soil excavation lift still shows most or all of the area above the cleanup level, the contamination in entire area is deeper than the initial lift. Coordinate with the excavation crew for additional soil excavation and repeat 5 and 6 as necessary until the area is clean.

4.4 Post-IRA Status Survey

The Post-IRA status survey includes scan radiation survey and static radiation survey. The scan radiation survey would have already been performed at 100% coverage during the excavation control survey for IRA support. This information will be used for scan radiation survey requirement for the Post-IRA status survey. The static direct gamma radiation level measurements for the Post-IRA survey will be implemented following the IRA and the remedial action support surveys. Static direct gamma radiation level survey will be performed at 80-foot triangular grid nodes in each area. The grid nodes were determined using a visual Sampling Plan (VSP) on an 80-foot triangular grid cast on a random origin during the RSE for most of the areas undergoing the interim remedial action. One-minute static gamma radiation survey will be performed at specified grid nodes or points within survey areas as a part of the Post-IRA status survey to demonstrate cleanup of areas. The technician will perform the static (stationary) gamma radiation survey as follows:

1. If the detector needs to be collimated for the area of interest, place the detector in the 0.5 inch lead collimator. Perform the function check as indicated in Section 4.2 of this procedure.
2. Insure that the Scaler/Rate meter (Ludlum 2221) is set in scaler (integration) mode and the integration time is set for one minute. Turn the Scaler/Rate meter audio speaker to the ON position.
3. Obtain the cleanup level direct gamma radiation count rate based on the correlation for the final status survey for bare and collimated detector.
4. Locate the final status survey points (grid node) using survey point location figures, the static survey point coordinate data, and the DGPS system.
5. Hold the detector at approximately 12 inches from the ground surface above the desired survey point. Obtain a one minute integrated count.
6. Record the counts in cpm and appropriate corresponding survey point information (location ID and/or coordinates etc) on the Static Gamma Radiation Survey Field Form (Attachment C).
7. If any of the reading is above the cleanup level based on the revised correlation for the final status survey, mark the survey point with a pin flag for investigation and addressing any residual contamination.
8. Repeat step 4 to 6 for additional static radiation measurements.

9. The Ra-226 concentration in the soil will be calculated from the gamma radiation survey counts (cpm) using the calibration equation established from the correlation for that detector. The results from the static gamma radiation survey and soil sampling results will be compared to the 2.24 pCi/gm Ra-226 level for demonstrating compliance with removal action of contaminated soil. If needed, data will then be evaluated using statistical method to determine if they exceed cleanup level.

5.0 ATTACHMENTS

Attachment A	Scaler/Rate meter-Detector Function Check Form
Attachment B	Scan/Walkthrough Gamma Radiation Survey Field Form
Attachment C	Static Gamma Radiation Survey Field Form

Function Check Source ID: 1% U₃O₈ Ore in Sealed can

Acceptable background Count (cpm) Range (20%) to .

Acceptable Source Count (cpm) Range (20%) _____ to _____

[illegible]

SOP-3a
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**Attachment B, SOP #RAD-03a
Gamma Radiation Survey @ UNC's NECR Mine Site**

Scan/Walkthrough Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter _____, Detector _____

Instrument Calibration Date: _____, Instrument Daily Function Check Performed: _____

2"x2" NaI Detector Collimated _____ Yes or _____ No.

Survey Area/Unit Description _____

Survey Date/Time	Survey Area-Transect ID/Description	Gamma Radiation Reading Range CPM	Comments/Notes

Technician Signature _____, Reviewed by _____

Static Gamma Radiation Survey Field Form

[illegible][illegible]

SOP-3a
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STANDARD OPERATING PROCEDURE 15
SURFACE SOIL SAMPLING

STANDARD OPERATING PROCEDURE 15

SURFACE SOIL SAMPLING

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1.0 INTRODUCTION

This standard operating procedure (SOP) describes methods and equipment commonly used for collecting environmental surface soil samples for chemical and geotechnical analyses. The information presented in this SOP is generally applicable to the collection of all surface soil samples, except where the analyte(s) may interact with the sampling equipment. This SOP defines sample collection procedures using hand augers, shovels/trowels, and soil core samplers. Procedures for collecting subsurface soil samples are outlined in SOP-14.

This document focuses on methods and equipment that are readily available and typically applied in collecting surface soil samples. It is not intended to provide an all-inclusive discussion of sample collection methods. Specific sampling problems may require the adaptation of existing equipment or design of new equipment. Such innovations shall be clearly described in the project-specific sampling plan and approved by the UNC Project Manager, MWH Project Manager, and the Quality Manager.

2.0 DEFINITIONS

Environmental Sample: A solid sample collected for chemical or geotechnical analysis. These samples are used to support remedial investigation, feasibility studies, treatability studies, remediation design and performance assessment, waste characterization, etc.

Hand Auger: A sampling tool consisting of a stainless steel tube with two sharpened spiral wings at the tip.

Shovel/Trowel: A sampling device consisting of a stainless steel spade attached to a handle.

Soil Core Sampler: A variable diameter stainless steel tube that can be attached to a hammer for driving into surface soil. The tube can also be fitted with retaining liners.

3.0 RESPONSIBILITIES

This section presents a brief definition of field roles, and the responsibilities generally associated with them. This list is not intended to be comprehensive and often additional personnel may be involved. Project team member information shall be included in project-specific plans (e.g., work plan, field sampling plan, quality assurance plan, etc.), and field personnel shall always consult the appropriate documents to determine project-specific roles and responsibilities. In addition, one person may serve in more than one role on any given project.

MWH Project Manager: Selects site-specific sampling methods, sample locations, and constituents to be analyzed with input from other key project staff.

Quality Manager: Overall management and responsibility for the sampling methods, sample locations, and constituents to be analyzed with input from other key project staff and UNC personnel.

Field Team Leader (FTL) and/or Field Geologist, Hydrogeologist, or Engineer: Implements the sampling program and supervises other sampling personnel. Prepares daily logs of field activities.

Sampling Technician (or other designated personnel): Assists the FTL, geologist, hydrogeologist, or engineer in the implementation of tasks. Performs the actual sample collection, packaging, and documentation (e.g., sample label and log sheet, chain-of-custody record, etc).

4.0 SURFACE SOIL SAMPLING

4.1 BACKGROUND

Surface soil samples are typically collected from the ground surface to 6 inches below ground surface. Samples collected from greater than 6 inches below ground surface are referred to as subsurface soil samples. Surface soil samples may be collected as grab

samples or as composite samples. The sample method is determined based on the physical characteristics of the site and matrix.

- **Grab sample:** A sample taken from a particular location. Grab samples are useful in determining discrete concentrations, but also provide spatial variability when multiple samples are collected.
- **Composite sample:** A number of samples that are individually collected then combined (homogenized) into a single sample for subsequent analysis. Composite samples are useful when averaged or normalized concentration estimates of a waste stream or an area are desired.

4.2 SAMPLING PROGRAM OBJECTIVES

The objective of surface soil sampling is to characterize chemical properties of the soil, and possibly identify potential sources of contaminants. Sampling objectives are typically diverse and dependent on the nature of the project data quality objectives. Details pertaining to sample locations, number of samples, and type of analyses required, shall be presented in project-specific work plans.

4.3 SAMPLING EQUIPMENT AND TECHNIQUES

A surface soil sample may consist of a single scoop or core, or the sample may be a composite of several individual samples. Surface soil samples shall be obtained using hand augers, shovels/trowels, or soil core samplers.

Hand Auger: A hand auger consists of a stainless steel tube with two sharpened spiral wings at the tip. The auger typically cuts a 2-inch to 3-inch diameter boring. Because the auger is hand-driven, penetration in dense or gravelly soil may be difficult. For surface soil sample collection, the procedures outlined below shall be followed. Procedures for sample handling and shipping are presented in SOP-12.

1. Advance the auger by hand into the soil, to the desired depth (6 inches or less for surface soil samples), by turning in a clockwise direction with downforce applied.
2. Retrieve the auger to the surface, preferably without rotation.
3. Fill sample jars using decontaminated stainless steel spatulas or spoons.
4. Place samples for other analyses into a stainless steel bowl for homogenization. Prior to homogenization, remove twigs, rocks, leaves and other undesirable debris if they are not considered part of the sample.

Shovel/Trowel: Various shovel/trowel designs and sizes are commercially available for a variety of sampling applications. These devices are hand-driven and are typically used for sampling relatively soft, unconsolidated soil deposits. Some designs (e.g., the sharpshooter™) can be driven into hard, rocky soil by opening a deep, narrow hole. Shovels or trowels used for surface soil sampling shall be made of stainless steel. The procedures outlined below shall be followed while collecting samples with shovels or trowels. Procedures for sample handling and shipping are presented in SOP-12.

1. Drive the shovel/trowel into the soil. If the soil is dense, use your own weight to drive the shovel by stepping on the rear edge of the shovel.
2. Retrieve the shovel/trowel to the surface.
3. Fill sample jars using decontaminated stainless steel spatulas or spoons.
4. Place sample for remaining analyses into a stainless steel bowl for homogenization. Prior to homogenization, remove twigs, rocks, leaves and other undesirable debris if they are not considered part of the sample.

Soil Core Sampler: Soil core samplers consist of variable diameter (commonly 1-2 inches), stainless-steel tubes that can be attached to a hammer using a cap to allow for driving into surface soil. The steel tubes can also be fitted with aluminum or stainless steel liners for the collection of undisturbed samples. Polyethylene liner caps are used to seal the ends of the tube after sample collection. Soil core samplers can be used to obtain soil samples for chemical or geotechnical analysis. The use of liners allows for the collection of undisturbed samples, minimal loss of volatiles, and easy shipping to the

analytical laboratory. The procedures outlined below shall be followed when collecting surface soil samples using this method.

1. Attach a stainless steel cap to the soil core sampler.
2. Attach the sampler and cap assembly to the hammer.
3. For the collection of undisturbed soil samples, install stainless-steel liners in the sampler.
4. Push the hammer and sampler into the surface soil. For dense soil, turn hammer slightly clockwise to enhance penetration.
5. Once the desired sample depth is reached, retrieve sampler to the surface and detach the sampler from the hammer.
6. To collect samples for chemical analysis, empty contents of the sampler into a stainless steel bowl for homogenization. Prior to homogenization, remove twigs, rocks, leaves and other undesirable debris if they are not considered part of the sample.

5.0 DECONTAMINATION

All equipment used in the sampling process shall be decontaminated prior to field use and between sample locations. Decontamination procedures are presented in SOP-3. Personnel shall don appropriate personal protective equipment as specified in the project-specific work plan. Any investigation-derived waste generated in the sampling process shall be managed in accordance with the procedures outlined in the Work Plan.

APPENDIX B
SOIL LOSS CALCULATIONS

SHEET 1 OF 4

[illegible]



INTRODUCTION

This soil loss analysis was prepared to estimate long term soil loss from the NECR-1 Pile at the Northeast Church Rock Mine Site. This analysis was performed as part of the NECR Interim Removal Action Plan, prepared for the United Nuclear Corporation (UNC).

METHODS

Soil loss was estimated using the Revised Universal Soil Loss Equation 2 (RUSLE2) version 1.26.6.4. (Foster and Yoder, 2006) RUSLE2 software is the primary tool used in erosion modeling by federal agencies (e.g., Office of Surface Mines and U.S. Forest Service) to assess soil loss for mine reclamation applications. RUSLE2 technology uses several factors in determining erosional extent including climate, soil properties, base management, slope length, shape, and gradient. The RUSLE2 soil loss equation is:

$$a=(r)(k)(l)(s)(c)(p);$$

where:

- a = daily soil loss
- r = rainfall/runoff
- k = soil erodibility
- l = slope length
- s = slope steepness
- c = cover management
- p = supporting practices

To obtain average annual soil loss, RUSLE2 sums all daily soil loss values (a) provided by the above equation. Site-specific parameters were entered in a soil loss model in order to obtain average annual soil loss for the drainage channel slopes and the out slopes of the NECR-1 pile at the NECR mine site. These parameters were:

1. R-factor of 13 (NRCS, 1999)
2. Time variant k factor based on topsoil stockpile soil characteristics
3. 1% and 5% grade, 137 foot (average) and 310 foot (max) slope length for NECR-1 drainage channel slopes
4. 42% grade, 125 foot (max) slope length for the NECR-1 out slope
5. Bare ground, no revegetation or natural growth factored into calculation
6. Perfect contouring, no row grade
7. Normal residue burial

Regional climate and soil data were input into RUSLE2 directly from the U.S. Department of Agriculture, Natural Resource Conservation Service. This database provided specific time-variant annual rainfall data as well as provided a soil type that most represents the stockpiled topsoil that will be used for backfill purposes.

**SOIL LOSS ANALYSIS**

Using the climate and soil data from the NRCS database and the slope designs for the NECR-1 Pile, RUSLE2 simulations estimated soil losses for several scenarios incorporating varying slope lengths and gradients that may be present on the NECR-1 Pile. In addition, rough surface base management practices were incorporated on the NECR-1 outslopes because doing so demonstrates a dramatic decrease in soil loss. The results of these simulations are shown below in Table 1.

Annual soil loss values were then used to estimate the amount of time it would take to erode away one inch of surface material using an assumed density of topsoil backfill material of 110 lbs/ft³. These calculations are included in Table 2.

TABLE 1 SOIL LOSS ANALYSIS RESULTS				
NECR-1 Top Surface Drainage	137 (average)	1%	0.36	555
NECR-1 Top Surface Drainage	310 (max)	1%	0.38	526
NECR-1 Top Surface Drainage	137 (average)	5%	1.6	125
NECR-1 Top Surface Drainage	310 (max)	5%	1.7	118
NECR-1 Outslopes	125 (max)	40%	19	11
NECR-1 Outslopes	125 (max)	40% (rough surface)	4.9	41

CONCLUSIONS

Based on RUSLE modeling, six inches of cover material on the top surface and 12 inches of material on the slopes will be sufficient to prevent exposure of underlying material due to sheet erosion prior to implementation of final removal actions.



MWH

By R. Young Date 5/11/2009 Client UNC NECR
Chkd. By JET Description NECR-1 IRA Soil Loss Estimate

Sheet 4 of 4
Job # 1006690

REFERENCES

Foster, George, Daniel Yoder, Jim Lyon, and Joel Lown. RUSLE2. Computer software.
Vers. 1.26.6.4. Revised Universal Soil Loss Equation Version 2. 8 May 2009
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

"RUSLE R-Factor Values for New Mexico." Map. USDA-NRCS. NRCS-NM, 1999.

WEEKLY REPORT ITEM

Enforcement & Compliance Assurance Issues

Non-Confidential

Region IX Enters into Administrative Order on Consent with United Nuclear Corporation and General Electric for Interim Removal Action at Former Uranium Mine Site in Navajo Nation

On July 24, 2009, Region 9 entered into an Administrative Settlement Agreement and Order on Consent ("AOC") with United Nuclear Corporation ("UNC"), a uranium mining company, and the General Electric Company ("GE"), UNC's indirect parent corporation, (collectively "Respondents"), requiring Respondents to perform an Interim Removal Action ("IRA") to address uranium-contaminated soils in specified areas in the vicinity of the Northeast Church Rock Mine Site ("Mine Site") located in the Navajo Nation, approximately 16 miles northeast of Gallup, New Mexico. EPA will oversee the IRA and Respondents have agreed to pay EPA's Past Response Costs at the Mine Site (up to \$1.5 million, with additional amounts reserved for future EPA claims) as well as EPA's Future Response Costs for expenses related to the IRA. As part of the IRA, Respondents will temporarily relocate families from three home sites that are within or adjacent to the area to be addressed by the IRA. The Navajo Nation supports the IRA AOC, which provides for Navajo Nation EPA representatives to receive copies of submittals at the same time they are provided to EPA. The value of the work to be performed pursuant to the AOC is estimated at \$5,000,000.

The Mine Site is adjacent to the United Nuclear Corporation NPL Site, which UNC is remediating under the oversight of the Nuclear Regulatory Commission and EPA Region 6. Under a Memorandum of Agreement between the Navajo Nation and EPA Regions VI, VIII, and IX, Region IX has the lead on any EPA response action on lands within the Navajo Nation. EPA has issued a proposed Engineering Evaluation/Cost Analysis ("EE/CA") for additional work at the Mine Site. Public comments on the EE/CA are due by September 9, 2009. Contacts: Laurie Williams, ORC, 415-972-3867 and Harrison Karr, ORC, 415-972-3939.